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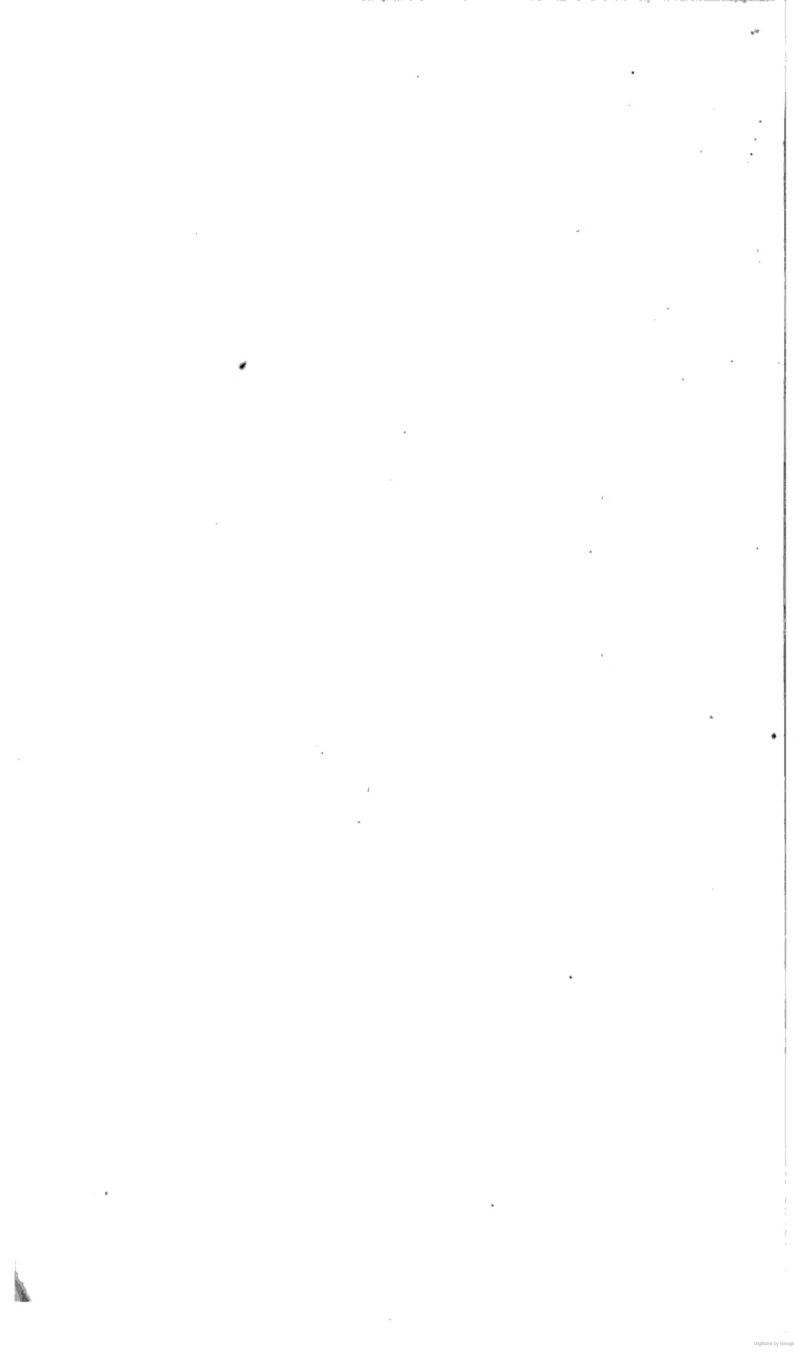
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A TREATISE  
ON  
MAST-MAKING,

FOR EVERY CLASS OR DESCRIPTION OF  
MERCHANT SHIPS OR VESSELS;

WHEREIN  
ARE SHOWN, ON ONE GENERAL PRINCIPLE, TAKEN FROM  
THE MAIN BREADTH OF EACH VESSEL,

THE LENGTH AND DIAMETER OF ALL MASTS AND YARDS,  
INCLUDING ALL THINGS CONNECTED THEREWITH;

ALSO,  
A SCALE FOR THE PROPER POSITION OR STATION  
FOR ALL MASTS,  
REGULATED BY THE VESSELS' LENGTH AT THEIR LOAD  
LINE OF FLOTATION,

INCLUDING  
MUCH USEFUL INFORMATION AS TO THE MASTING  
OF VESSELS;

WITH  
PLAIN PRACTICAL TABLES,  
SHOWING THE PROPER METHOD FOR MAKING ALL DESCRIPTIONS OF MASTS AND YARDS, FROM A BOAT TO A  
SHIP OR BARQUE OF ANY MAGNITUDE.

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WRITTEN FOR THE USE OF  
Ship-Builders, Ship-Masters, and Ship-Carpenters.

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BY JOHN COCKE.

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### Errata.

Page 15 line 13 for "one quarter of 22 feet 11 inches" read  
"add one quarter to 22 feet 11 inches."

" 16 " 1 read " the whole length of the Bowsprit. In  
the bed they are always left square."

" 31 " 22 for "levelled" read "bevelled."

" 41 " 14 for "fin" read "pin."



## A TREATISE, &c.

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AMONG the many necessary qualities which constitute a well regulated sea-going vessel, there is not one of greater importance, or one that should require greater research or attention, than that of producing correct rules for the station of the masts of all classes or description of vessels. On this much depends not only in respect to their sailing qualities, but that which is of greater importance, being immediately connected with the safety of the vessel, their stability.

When we take into view the casualties which too often occur by vessels paying off, or broaching too, it must be obvious to all concerned in maritime affairs, that the safety of vessels often depends on their being kept steady in all weathers; which shows there is not one more essential property connected with ship-building and ship-sailing, than a given principle, whereby rules may be laid down to find the true position of vessels' masts; yet there is not one so glaringly neglected, or to which there has been so little attention paid. There is too much truth in the observation, that with many ship-builders and ship-masters, their enquiry and attention is not that every thing on deck should give place to the best station for the vessel's masts, but the first question with them is the placing the hatchways, the station of the windlass, the stowing of the long boat, yes, even the placing of the cook house appears of greater importance.

*image  
not  
available*



Again, it may be possible that the masts of a vessel may be stationed so as to steer well, and to all appearance correct, and yet her masts may not be in the best possible position to produce her best rate of sailing. Many vessels are termed dead heavy sailers, whose sailing qualities may be greatly improved by a small alteration in the position of their masts.

Having, through long experience, observation, and enquiry, produced a principle for the station of the masts of every class of vessels, (in conformity with the system of building laid down in a work about to be published by myself on practical shipbuilding), being produced, simply from the load water line, which will prove correct generally; yet, being aware of the impracticability of giving a standard rule to meet every case, from the great variation in the position of dead flat, now so generally, and, too often, so erroneously adopted, no certain principle can be adduced to meet so wide a range of opinion by which vessels are now built. It must, therefore, be understood, that the rules herein laid down, for the position of vessels' masts, are given for those whose dead flat are near, or a little the foreside, of their half-length, whose centre of displacements is at the centre of the vessel's length, for such the principles laid down will be found correct.

*To produce the position of a Ship or Barque's Masts.*

Square up to the deck, from the rabbet of the stem at the load line, on which make a spot; in like manner, square up to the deck the load line at the rabbet of the

stern post ; measure the length between those two spots, which divide into nineteen equal parts; let the centre of the fore-mast be at three nineteen parts, the aft side of the spot squared up from the rabbet of the stern, and the centre of the main-mast at eleven nineteen parts the aft side of the above spot, and the centre of the mizzen mast at fifteen nineteen from the said spot. Should the vessel be a barque, in that case the centre of the mizzen-mast is only to be fourteen and half time the aft side. Example :—Suppose the length of the ship, from the squaring up at the rabbet of the stem to the squaring up at the rabbet of the stern post, at the load line of flotation, to be 95 feet ; divide this by nineteen, gives each division five feet ; as such, the centre of the fore-mast will be the aft side of the squared spot of the rabbet of the stem, 15 feet, the centre of the main-mast will be 55 feet the aft side of the spot, and the centre of the mizzen-mast 75 feet the aft side of the spot. If the vessel is a barque, the centre of her mizzen-mast will be at  $72\frac{1}{2}$  feet the aft side of the foremost spot.

*To produce the position of a Brig's Masts.*

Set up on the deck two spots, from the rabbet of the stem to the rabbet of the stern post, at the load line, in the manner as already stated ; divide the space between into fifteen equal parts ; set aft, from the squaring up of the rabbet of the stem,  $2\frac{1}{2}$  of fifteen parts, as the centre of the foremast, and, from the same spot, nine fifteen parts for the centre of the main-mast ; that is, suppose the vessel to be 75 feet between the squarings

up at the load line, by dividing 75 feet by 15 gives each division 5 feet ; as such, the centre of the fore-mast will be  $12\frac{1}{2}$  feet abaft the fore spot, and the centre of the main mast 45 feet aft from the spot.

*To produce the position of the Masts of a Schooner.*

Set up two spots, as already stated, the space between divide into thirteen equal parts ; set aft, from the foremost squaring up, three thirteen parts as the centre of the fore-mast, and eight thirteen parts for the centre of the main-mast. Example:—Suppose the vessel's length at the load water line to be 65 feet, which divide by 13; as such, each division will be 5 feet, which gives the centre of the fore-mast at 15 feet aft from the spot, and the centre of the main-mast 40 feet aft of the spot.

*To produce the position for the Masts of a Ketch.*

From the squarings up of the rabbet of the stem and stern post, at the load water line, take the distance, which divide into 12 equal parts ; let the centre of the main-mast be at four twelfths, and the centre of the mizzen-mast at nine twelfths abaft the foremost spot ; that is, suppose the vessel's length, between the squarings up from the rabbet of the stem and stern post, at the load water line, to be 60 feet, which divide by 12, each division will be five feet ; this gives the centre of main-mast 20 feet aft, and the centre of the mizzen-mast at 45 feet abaft the spot squared up from the rabbet of the stem.

*To find the position for the Mast of a Cutter or Smack.*

Square up two spots, as already stated, the space between divide into nine equal parts; let the centre of the mast be at four ninths abaft the foremost squaring up spot. Example:—Suppose the vessel's length between the spots to be 63 feet, by dividing this by nine gives the divisions 7 feet, therefore the centre of the mast will be 28 feet aft of the fore spot.

Should vessels be built whose main breadth is far forward, in that case it would be advisable to fix the centre of their masts a quarter or a third of a division forward of those rules laid down, to meet the centre of her displacement, for over this centre should, if possible, be the point of pressure on the canvass, which shews the great advantage those masters who attend to the stowage of their vessel's cargoes derive over others, because it should ever be kept in view that a ship, like every other piece of mechanism, by losing her equilibrium, loses those essential qualities which alone forms her safety.

Having, in the foregoing chapters, produced a principle for the position of the masts of every description of vessels, which leads me to take under consideration rules for the length and diameters of all masts and yards, with a plain, yet correct, method of producing them.

Many volumes have been written on the subject of masts and yards, with a view of producing a principle as to length and diameters, yet, from those publications,

nothing conclusive have been adduced so as to become a standard in all cases ; and why ? because, in the first place, nearly all works published on masting have been those either confined to ships of the navy, or, if they glanced at merchant ships, they are produced on the same principles ; and it is generally considered, by our best seamen, that ships of the navy are over masted. Again, those works which have been published, with a view of producing a standard for merchant ships and vessels, have grounded their theory on equivocal principles, being produced by rules founded on the length of the vessel ; this theory, if duly considered, will immediately show its fallacy, and prove to a demonstration that the length of the vessel has nothing whatever to do with the length or proportions of her masts and yards ; for this very reason, small vessels, whose length is to their breadth as three is to one, would be under masted, whereas large vessels, whose length is to their breadth as four to one, and some even as five is to one, would, by the same rule, be considerably over masted ; the same objections would arise was the breadth included with the length, which is done in the navy.

I therefore present to my readers a system, founded on one general principle, for the length and diameter of all masts and yards, produced from the main breadth of each vessel, which alone forms the standard of a vessel's stability.

Having undertaken this little work, with a view of rendering it useful as well as cheap, it is not my intention to burthen it with useless remarks, I shall therefore proceed in producing a ship or brig's main mast, from

which all other masts and yards are produced. First, take the vessel's extreme breadth, from this deduct  $\frac{1}{12}$ ; the remainder multiply by two, which gives the length of the main mast from the deck to the head;  $\frac{1}{5}$  of this gives the length of the mast head from the upper part of the hounds; add to this length the depth from the deck to the step, gives the extreme length of the main mast. To find the diameter at the deck,  $\frac{3}{4}$  of an inch to the foot of the reduced main breadth, the diameter at the hounds  $\frac{1}{8}$  less than the diameter at the deck, the diameter above the hounds  $\frac{1}{8}$  less than at the hounds, and at the head  $\frac{1}{8}$  less than the diameter above the hounds.

Example:—Suppose the vessel's extreme breadth to be 25 feet, from this deduct  $\frac{1}{12}$ , the remainder will be 22 feet 11 inches; this multiply by 2, gives 45 feet 10 inches, which is the length of the main mast from the deck to the head;  $\frac{1}{5}$  of this length gives 9 feet 2 inches; as the length of the head add to this length, the depth from the deck to the step, say 16 feet 6 inches, gives the extreme length of the mast 62 feet 6 inches,  $\frac{3}{4}$  of an inch to the foot of 22 feet 10 inches gives  $17\frac{1}{4}$  inches as the diameter in the deck;  $\frac{1}{8}$  less gives  $15\frac{1}{8}$  inches as the diameter at the hounds;  $\frac{1}{8}$  less gives  $13\frac{1}{4}$  inches as the diameter above the hounds;  $\frac{1}{8}$  less gives  $11\frac{5}{8}$  inches as the diameter at the head of the mast. To find the length of the main-top-mast, take  $1\frac{1}{2}$  of 22 feet 11 inches, the reduced breadth, which gives 34 feet 4 inches, of which  $\frac{1}{7}$  is 4 feet 11 inches, the length of the mast-head, and  $\frac{1}{2}$  inch to the foot of 22 feet 11 inches gives  $11\frac{1}{2}$  inches as the diameter at the foot;  $\frac{1}{8}$  less than



the diameter at the fid gives  $10\frac{1}{16}$  inches as the diameter at the hounds; and  $\frac{3}{4}$  of the hounds gives  $7\frac{5}{8}$  inches as the diameter above the hounds; and  $\frac{1}{8}$  less than the diameter above the hounds gives  $6\frac{3}{4}$  inches as the diameter at the head. Length of the top-gallant-mast half the length of the top-mast, gives 17 feet 2 inches, of which  $\frac{1}{6}$  is for the head, gives 2 feet 10 inches; if the top-gallant-mast has a royal-mast in the same, the length, from the heel to the sheave hole, if 14 feet 6 inches, the length of the royal-mast  $\frac{2}{3}$  of the top-gallant gives 9 feet 8 inches, length of the pole head 6 feet; diameter of the top-gallant-mast at the fid half the diameter of the main-top-mast, which is  $5\frac{3}{4}$  inches;  $\frac{5}{8}$  less at the hounds, gives  $5\frac{1}{16}$  inches; diameter of the royal-mast in the heel  $\frac{1}{8}$  less gives  $4\frac{3}{8}$  inches, at the head 4 inches, pole heel  $3\frac{1}{2}$ , head 3 inches. Having produced a standard from the main breadth for the length and diameters of main-mast, main-top-mast, top-gallant-mast, royal-mast, and pole head, the next is to produce the length and diameters of the yards connected with the main-mast. Length of the main-yard, twice the reduced breadth, gives 45 feet 10 inches; diameter in the slings  $\frac{1}{2}$  inch to the foot of 22 feet 11 inches gives  $11\frac{1}{2}$  inches;  $\frac{1}{2}$  the diameter of the slings gives  $5\frac{3}{4}$  inches; the diameter at the yard-arm, the stop at each yard-arm, 1 foot in 20 feet of the yard's length gives 2 feet 3 inches. Length of the main-top-sail yard  $1\frac{1}{2}$  of 22 feet 11 inches gives 34 feet 4 inches diameter in the slings,  $\frac{2}{3}$  of the diameter of the main-yard gives  $7\frac{5}{8}$  inches, the half of which is  $3\frac{7}{8}$  inches, as the diameter of the yard-arm; the stop at each yard-

arm one inch to the foot of the yard's length, which gives 2 feet 10 inches; length of the top-gallant-yard, the given breadth which is 22 feet 11 inches diameter in the slings, half the diameter of the main-yard, gives  $5\frac{3}{4}$  inches diameter at the yard-arm, half the slings gives  $2\frac{7}{8}$  inches; the stop at each yard-arm, one inch in the foot of the whole length, gives 1 foot 11 inches. Length of the royal-yard,  $\frac{2}{3}$  the length of the top-gallant-yard, gives 15 feet 4 inches; stop at each yard-arm, one inch to the foot of the yard's length, gives 15 inches; diameter in the slings,  $\frac{2}{3}$  of the diameter of the top-gallant-yard, gives near 4 inches, half the slings for the yard-arm gives 2 inches, the top one inch, to the foot of the length of the yard gives 15 inches.

From the main-mast and yards we shall produce those of the fore-mast, which are to be reduced from the main  $\frac{1}{12}$  in length and size. Fore-mast  $\frac{1}{12}$  in length less than the main, gives 42 feet from the deck to the head; from this take  $\frac{1}{3}$  for the mast head, gives 8 feet 5 inches; to which add the length from the step to the deck, say 15 feet, gives the extreme length of the foremast, 57 feet; diameter at the deck  $\frac{1}{12}$  less than the main, gives  $15\frac{7}{8}$  inches; and the diameter at the hounds  $\frac{1}{8}$  less, gives 14 inches; the diameter above the hounds  $\frac{1}{8}$  less, gives  $12\frac{1}{4}$  inches, and the diameter at the mast head  $10\frac{3}{4}$  inches. Length of the fore-top-mast  $\frac{1}{12}$  less than the main, gives 31 feet 6 inches, of which the head is 4 feet 6 inches. Diameter at the fid  $10\frac{5}{8}$  inches; diameter at the hounds  $\frac{1}{8}$  less, gives  $9\frac{3}{8}$  inches; diameter above  $\frac{3}{4}$  of the hounds gives 7 inches; the diameter at the head  $\frac{1}{8}$  less than the diameter above the hounds, gives  $6\frac{1}{8}$  inches. Length of



the fore-top-gallant-mast half the length of the top-mast, gives 15 feet 9 inches, length of the head 2 feet 9 inches; if the top-gallant-mast has a pole head, the length of the top-gallant-mast will be 13 feet 4 inches;  $\frac{2}{3}$  of which, the length of the royal mast, in the same, gives 8 feet 10 inches; pole head 4 feet 5 inches. Diameter of the top-gallant mast in the fid, half the diameter of the top-mast, gives  $5\frac{3}{8}$  inches; diameter at the head  $\frac{1}{8}$  less, gives  $4\frac{3}{4}$  inches; diameter at the royal mast heel  $4\frac{1}{4}$  inches, at the head  $3\frac{3}{4}$  inches; diameter at the pole head  $3\frac{1}{4}$  in. by  $2\frac{7}{8}$  inches. Length of the fore-yard  $\frac{1}{12}$  less than the main, gives 42 feet, the diameter in the slings,  $10\frac{5}{8}$  inches; diameter of the yard arms  $5\frac{3}{8}$  inches; the stop at each yard arm, one foot in 20 of the whole length, gives 2 feet. Length of the fore-top-sail-yard, 31 feet 6 inches; diameter in the slings,  $7\frac{1}{8}$  inches; diameter at the yard arm,  $3\frac{5}{8}$ ; the stop at each yard arm, one inch in the foot of the length of the yard, gives 2 feet 7 inches; length of the fore-top-gallant-yard,  $\frac{1}{12}$  less than the main, gives 21 feet; diameter in the slings, half the diameter of the fore-yard, gives  $5\frac{3}{8}$  inches; the diameter at the yard-arms  $2\frac{3}{4}$  inches, stop at each yard-arm one inch in the foot of the length, gives one foot 9 inches; length of the royal-yard  $\frac{2}{3}$  of the top-gallant yard, gives 14 feet; the diameter in the slings  $3\frac{3}{4}$  inches, and  $1\frac{7}{8}$  inch for the arm, stop one inch to the foot of the length, gives 14 inches.

In producing the mizzen masts and yards for a ship they are to be reduced in length and diameters  $\frac{1}{5}$  less than the foremast and yards, excepting the cross-jack

yard, which is to be reduced in diameter of the foreyard  $\frac{1}{4}$ ; as such, the length of the mizzen mast will be 33 feet 8 inches from the deck to the head; take therefrom  $\frac{1}{6}$  as the length of the head, which gives 5 feet 7 inches. Suppose the length from the deck to the step 14 feet, gives 47 feet 8 inches as the extreme length of the mizzen mast; diameter in the deck  $12\frac{3}{4}$  inches, diameter at the hounds  $11\frac{1}{4}$  inches, above the hounds  $9\frac{7}{8}$  inches; diameter at the head  $8\frac{1}{2}$  inches; length of the mizzen topmast, 25 feet 3 inches. Deduct therefrom 3 feet 8 inches for the head, the diameter at the fid  $8\frac{1}{2}$  inches, diameter at the hounds  $7\frac{1}{2}$  inches, above the hounds  $5\frac{1}{4}$  inches, diameter at the head  $4\frac{3}{4}$  inches, length of the mizzen topgallant mast 10 feet 6 inches, pole head 7 feet, diameter at the fid  $4\frac{1}{2}$  inches, at the head  $3\frac{7}{8}$  inches, the diameter at the pole 3 inches, at the head  $2\frac{1}{2}$  inches. The length of the mizzen or cross-jack yard  $\frac{1}{5}$  short of the fore yard, gives 33 feet 8 inches; diameter in the slings  $\frac{1}{4}$  less than the fore yard, gives 8 inches, diameter at the yard arms 4 inches, length of the stop 1 foot 8 inches. The length of the mizzen topsail yard 25 feet 3 inches; diameter in the slings  $5\frac{3}{4}$  inches, at the yard arms  $2\frac{7}{8}$  inches; length at the stop 2 feet, length of the mizzen topgallant yard 17 feet, diameter in the slings  $4\frac{5}{8}$  inches, diameter at the yard arms  $2\frac{1}{4}$  inches, length of the stop 1 foot 5 inches, length of the spanker boom  $1\frac{1}{4}$  of 22 feet 11 inches, gives 27 feet 4 inches; diameter at the sheet,  $\frac{1}{4}$  of an inch to the foot of 22 feet 11 inches, gives  $5\frac{1}{4}$  inches at the ends;  $\frac{1}{5}$  less gives  $4\frac{1}{8}$  inches; length of the gaff 22 feet 11 inches, diameter 3 feet from

the mast,  $\frac{1}{5}$  of an inch to the foot of 22 feet 11 inches, gives  $4\frac{1}{2}$  inches,  $\frac{2}{3}$  of which gives 3 inches for the outer end.

If the vessel is rigged as a barque, the length of the mizzen mast to be  $\frac{1}{4}$  short of the main mast, which gives 39 feet from the deck to the head, of which  $\frac{1}{3}$  is for the head, gives 7 feet 9 inches; to this add 14 feet, the depth from the deck to the step, gives 53 feet extreme length; diameter  $\frac{1}{5}$  less than the foremast, or  $\frac{1}{4}$  less than the diameter of the main mast, gives 13 inches;  $\frac{7}{8}$  of the deck for the hounds, gives  $11\frac{3}{8}$  inches, above the hounds 10 inches, at the head  $8\frac{3}{4}$  inches; length of the mizzen topmast <sup>add</sup>  $\frac{1}{4}$  to ~~22~~ 22 feet 11 inches, gives 28 feet 8 inches; to which add  $\frac{1}{4}$  for the pole head, gives 7 feet 2 inches; diameter at the fid  $\frac{1}{5}$  less than the fore topmast, gives  $8\frac{1}{2}$  inches;  $\frac{1}{8}$  less for the head, gives  $7\frac{1}{2}$  inches; pole head 6 inches, head 5 inches. Length of the mizzen boom  $1\frac{5}{12}$  of 22 feet 11 inches, gives 32 feet 5 inches; diameter at the sheet  $\frac{3}{8}$  of an inch to the foot of 22 feet 11 inches, gives  $8\frac{1}{2}$  inches; diameter at the outer end  $\frac{2}{4}$  of the sheet, gives  $6\frac{3}{8}$  inches in board end;  $\frac{2}{3}$  of the sheet gives  $5\frac{1}{2}$  inches; length of the gaff  $1\frac{1}{8}$  of 22 feet 11 inches, gives 25 feet 10 inches; diameter three feet from the mast five inches, outer end  $3\frac{1}{4}$  inches.

Length of the bowsprit,  $1\frac{1}{2}$  of 22 feet 11 inches, gives 34 feet 4 inches; diameter in the bed,  $\frac{1}{12}$  less than the main-mast, gives  $15\frac{7}{8}$  inches; diameter at the outer end,  $\frac{7}{8}$  of the bed, gives  $13\frac{7}{8}$  inches; diameter at the heel 14 inches. Bowsprits are frequently made from 2 to 3 inches deeper than the diameter, and the sides are left

square in the middle 4 or 5 inches, the whole length of the bowsprit in the bed; they are always left square at the inner part, 8 squared; there are stops worked on the under side,  $\frac{2}{3}$  from the bed to the end, to secure the fore stay; the sides are always left square at the outer end, the breadth, and length of the bees. Length of the jibboom,  $1\frac{3}{8}$  of 22 feet 11 inches, gives 31 feet 6 inches; diameter in the cap the same as the main-topsail-yard, that is  $7\frac{5}{8}$  inches; at the outer end,  $\frac{1}{4}$  less, gives  $6\frac{3}{4}$  inches. Length of the flying jibboom,  $\frac{1}{2}$  the length of the jibboom, gives 15 feet 9 inches; diameter,  $\frac{1}{3}$  less, gives  $5\frac{5}{8}$  inches; diameter, at the outer end,  $4\frac{1}{2}$  inches.

Having, through the main breadth, produced a table for the lengths and diameters of a ship or barque, masts, yards, &c., whose extreme breadth is 25 feet, the principle of this table holds good for every square rigged vessel, whatever may be their breadth; as such, it will be useless to multiply tables for every size vessel, thereby swell this work to no useful purpose, this being a standard to guide all persons about to make a mast or any spar required for a brig, ship, or barque, (whatever may be their breadth); to such, it will require no further trouble than to produce the extreme breadth of the vessel, which we will now suppose to be either 22 feet or 28 feet 6 inches, the rule being shown for a vessel whose breadth is 25 feet, which gives for the length of her main-mast, from deck to head, 45 feet 10 inches. Then, if 25 feet gives 45 feet 10 inches, what will 22 feet give? The answer is 40 feet 4 inches, the length of the main-mast from deck to the head; of this length take  $\frac{1}{5}$  for the head, which gives 8 feet, to

this length add the depth in the hold. The diameter is produced in like manner, viz. :—If 25 feet gives  $17\frac{1}{4}$  inches diameter at the deck, what will 22 feet give? Answer,  $15\frac{3}{4}$  inches. All lengths and diameters are produced by the same rule. That I may be fully understood, we will produce the main-top-mast of the vessel whose main breadth is 28 feet 6 inches. If 25 feet gives 34 feet 4 inches, what will 28 feet 6 inches give? The answer is 39 feet 2 inches. It may be probable that some of my readers may not have the opportunity at all times to go through with those calculations, there is for their government tables of dimensions, in length and diameter, of every size mast and yard suitable for vessels from 14 feet to those of 32 feet 6 inches extreme breadth; in this case it will only require to produce the main breadth of either a brig, ship, or barque; deduct therefrom  $\frac{1}{12}$ . Look at table No. 1, under heading reduced main breadth, for the breadth required, against which will be seen the length, from the deck to the head, of the required lower-mast, top-mast, top-gallant-mast, without and with a pole head, against which is the main diameters. By referring to table No. 3 look for the main diameter, against which is shown the diameter of each setting off from the deck to the hounds, and from the hounds to the head; again, by deducting  $\frac{1}{12}$  of the reduced main breadth for the fore-mast, and  $\frac{1}{5}$  for the mizzen-mast, agreeable to the rule laid down for a ship or barque, refer that breadth to the table, against which is shewn the length and main diameters of each respective lower-mast, top-mast, and top-gallant-mast. All yards are

shown in like manner. Look in table No. 2 for the given length of the lower-mast, from the deck to the head, against which is shown the length of the lower-yard, top-sail-yard, top-gallant-yard, and royal-yard, with their diameters in the slings and yard-arms. By referring to table No. 4, and against the diameter of the slings, will be seen the diameters at each quartering; in this place I would observe, that in setting off the quarterings, there is given one setting off more than is in general use, that is, the first at the deck for lower-mast, at the fid for top-mast and top-gallant-mast, and for yards at the slings; and from which divide the mast to the hounds, and from the slings of yards to the yard-arm, into 4 equal parts, this gives five settings off instead of four, which is in common practice; by giving this extra division it prevents the mast or yard, in making, from being chopped in holes.

In finishing with square rigged vessels, it remains to give the length and diameters of the main-boom and gaff of a brig. The length of the main-boom to be  $1\frac{3}{4}$  of the reduced main breadth, that is, if the vessel's main breadth is 23 feet, by taking therefrom  $\frac{1}{12}$ , gives 21 feet 1 inch; as such, the length of the boom will be 36 feet 10 inches; diameter at the sheet  $\frac{3}{8}$  of an inch to the foot of the reduced breadth, gives  $7\frac{7}{8}$  inches; the diameter at the mast  $\frac{2}{3}$  of the sheet, gives  $5\frac{1}{8}$  inches; outer end  $\frac{1}{8}$  more, gives  $5\frac{3}{4}$  inches; length of the gaff  $1\frac{1}{4}$  of the given breadth, gives 26 feet 3 inches; diameter 4 feet from the mast,  $\frac{1}{4}$  of an inch to the foot of the given breadth, gives  $5\frac{1}{4}$  inches; outer end  $\frac{2}{3}$ , gives  $3\frac{1}{2}$  inches. By the same rule royal yards are produced,



the length of which are to be  $\frac{3}{4}$  of the top-gallant-yard connected with it, and  $\frac{3}{4}$  of their diameter ; try-sail-mast, the length to be governed by the height of the top ; their diameter at the lower end the same as the boom in the sheet, the diameter at the head  $\frac{1}{8}$  less.

*Rule for Masting a Schooner.*

A schooner's mast and yards are produced by taking the main breadth of the vessel, without any deduction ; that is, suppose the vessel about to be masted is 20 feet 6 inches extreme breadth,  $2\frac{1}{4}$  of this breadth gives 46 feet, which is the length from deck to the head of the main-mast ; deduct therefrom  $\frac{1}{6}$  for the mast-head, gives 7 feet 8 inches ; add the depth in the hold, say 13 feet, gives the whole length 59 feet ; diameter at the deck  $\frac{3}{4}$  of an inch to the foot of 20 feet 6 inches, gives  $15\frac{3}{8}$  inches ; diameter at the hounds  $\frac{1}{8}$  less, gives  $13\frac{1}{2}$  inches ; diameter at the head  $\frac{1}{2}$  inch to the foot of the breadth, gives  $10\frac{1}{4}$  inches. Length of the main-top-mast  $1\frac{1}{2}$  of the main breadth, gives 30 feet 9 inches, to which add  $\frac{1}{5}$  for the pole head, gives 6 feet ; whole length 36 feet 9 inches ; diameter in the cap  $\frac{7}{12}$  of an inch to the foot of the main breadth, gives  $8\frac{3}{4}$  inches ; head  $\frac{1}{8}$  less, gives  $7\frac{5}{8}$  inches ; pole lower part  $\frac{1}{4}$  less, 6 ; head 5 inches. Length of the main-boom  $1\frac{3}{4}$  of the main breadth, gives 36 feet ; diameter of the sheet  $7\frac{1}{16}$  of main breadth, gives  $8\frac{3}{4}$  inches ;  $\frac{1}{8}$  less at the outer end, gives  $7\frac{5}{8}$  inches ; inner end  $\frac{2}{3}$  of the sheet, gives 6 inches. Length of the main-gaff  $1\frac{1}{4}$  of main breadth, gives 25 feet 6 inches ; diameter 4 feet from the mast,  $\frac{1}{5}$  of the diameter of the main-boom, gives 6 inches ;

the outer end  $\frac{2}{3}$  of the main diameter, gives 4 inches. Length of the fore-mast  $\frac{1}{12}$  less than the main, gives 42 feet from the deck to the head; from which deduct  $\frac{9}{8}$  for the head, gives 7 feet; diameter at the deck  $\frac{1}{12}$  less than the main, gives 14 inches;  $\frac{1}{8}$  less at the hounds, gives  $12\frac{1}{4}$  inches; diameter above  $\frac{1}{8}$  less, gives  $10\frac{3}{4}$  inches; head  $9\frac{3}{8}$  inches. Length of the fore-top-mast  $1\frac{1}{4}$  of the main breadth, gives 25 feet 6 inches. If the top-gallant-mast is in the same, the length of the top-mast is then to be 23 feet 6 inches. Length of the top-gallant-mast 10 feet 6 inches, the pole head 6 feet; diameter of the top-mast in the cap  $\frac{1}{2}$  inch to the foot of the main breadth, after deducting  $\frac{1}{12}$ , which gives  $8\frac{1}{8}$  inches; diameter at the hounds  $\frac{1}{8}$  less, gives  $7\frac{1}{8}$  inches; diameter of the top-gallant-mast heel  $6\frac{1}{2}$  inches, head  $5\frac{3}{4}$  inches; diameter of the pole 5 inches heel,  $3\frac{3}{4}$  inches head. Length of the fore-top-gallant-mast, independent of the top-mast, 13 feet; pole head half 6 feet 6 inches; diameter at the fid  $6\frac{1}{2}$  inches, hounds  $\frac{1}{8}$  less, gives  $5\frac{3}{4}$  inches; diameter of the pole heel 5 inches, head 4 inches. Length of the head of the fore-top-mast 3 feet 6 inches; diameter above the hounds  $6\frac{3}{4}$  inches, at the head 6 inches. Length of the fore-yard twice the main breadth, gives 41 feet; stop at each yard-arm 1 foot in 20 of the length, gives 2 feet; diameter in the slings  $\frac{2}{5}$  of an inch to the foot of the main breadth, gives 8 inches; diameter at the yard-arm 4 inches. Length of the fore-top-sail-yard  $1\frac{1}{2}$  of the main breadth, gives 30 feet 9 inches; diameter in the slings  $\frac{3}{8}$  of an inch to the foot of the main breadth, gives  $7\frac{1}{2}$  inches; diameter at the yard-arm  $3\frac{1}{4}$  inches;



stop at each yard-arm one inch to the foot of the length of the yard, gives 2 feet 6 inches. Length of the top-gallant-yard, the main breadth, gives 20 feet 6 inches; stop at each yard-arm 20 inches; diameter in the slings  $\frac{1}{4}$  of an inch to the foot of the main breadth, gives  $5\frac{1}{4}$  inches; diameter at the yard-arm  $2\frac{3}{8}$  inches. Length of the royal-yard  $\frac{3}{4}$  of the top-gallant-yard, gives 15 feet 4 inches; diameter in the slings half the top-sail-yard, gives  $3\frac{7}{8}$  inches; diameter at the yard-arm 2 inches; stop at each yard-arm 15 inches. Length of the fore-try-sail-boom and gaff the length between the fore and main-mast, at the height of the swing of the boom; diameter of the boom  $\frac{2}{3}$  of an inch of the main breadth, gives  $7\frac{1}{2}$  inches; at the mast  $\frac{1}{3}$  less, gives 5 inches; diameter of the gaff 3 feet from the mast,  $\frac{1}{8}$  less than the main-gaff, gives  $5\frac{1}{4}$  inches; diameter at the end  $\frac{2}{3}$  of the inner part, gives  $3\frac{1}{2}$  inches. Standing bowsprit—First, deduct  $\frac{1}{12}$  from the main breadth, of which take  $1\frac{1}{2}$ , which gives 28 feet 3 inches as the length of the bowsprit; diameter in the bed the same as the fore-mast, that is 14 inches; diameter at the outer end  $\frac{1}{8}$  less, gives  $12\frac{1}{4}$  inch, inner end  $12\frac{1}{4}$  inch. Length of the jibboom  $1\frac{1}{4}$  of the reduced main breadth, gives 23 feet 6 inches; diameter in the cap  $\frac{3}{8}$  of an inch to the foot of the reduced main breadth, gives  $7\frac{1}{2}$  inches; outer end  $\frac{1}{8}$  less, gives  $6\frac{1}{2}$  inches. If the schooner has a running bowsprit, its length is to be  $1\frac{3}{5}$  of the main breadth, which gives 33 feet; diameter in the bed  $\frac{5}{8}$  of an inch to the foot of the main breadth, gives  $12\frac{3}{4}$  inches; at the outer end  $\frac{1}{8}$  less, gives  $11\frac{1}{8}$  inches. If the vessel is rigged as a brigantine, in that case the di-

mensions of the fore-mast and yards are to be taken in like manner to a brig's of the same main breadth. If a schooner, whose main breadth is greater or less than 20 feet 6 inches, the calculations of her masts and yards are to be produced by the same rule as above, or by the rule of three as already shown; or by referring the length of her lower-masts, top-masts, and bowsprit, to the table.

*Rule for Masting a Ketch.*

To mast a ketch, whose main breadth is 18 feet; length of the main mast from the deck to the head  $2\frac{1}{2}$  of the main breadth, which gives 40 feet 6 inches, of which  $\frac{1}{6}$  is for the head, gives 6 feet 9 inches; add to this length the depth from the deck to the step, say 10 feet, gives the whole length of the main mast 50 feet 6 inches; diameter in the deck  $\frac{1}{4}$  of an inch to the foot of the main breadth, gives  $13\frac{1}{2}$  inches;  $\frac{1}{8}$  less for the diameter at the hounds, gives  $11\frac{7}{8}$  inches; above the hounds,  $\frac{1}{8}$  less gives  $10\frac{3}{8}$  inches; diameter at the head  $9\frac{3}{4}$  inches; length of the main topmast  $1\frac{1}{2}$  of the main breadth, gives 27 feet above for the topgallant sail;  $\frac{1}{2}$  gives 9 feet, pole head 4 feet 6 inches; diameter at the fid of main topmast  $\frac{7}{16}$  of an inch to the foot of main breadth, gives 8 inches;  $\frac{1}{8}$  less at the hounds gives 7 inches, lower end of the topgallant mast 6 inches, upper end 5 inches, pole 4 and 2 inches. Length of the main boom, the distance between the main mast and mizzen mast; diameter at the sheet  $\frac{7}{16}$  of an inch to the foot of main breadth, gives 8 inches;  $\frac{1}{8}$  less to the mast, gives 7 inches; length of the gaff the length of the boom,

diameter 3 feet from the mast;  $\frac{5}{16}$  of an inch to a foot of main breadth, gives  $5\frac{5}{8}$  inches outer end;  $\frac{1}{8}$  less,  $4\frac{3}{4}$  inches; length of the fore or cross-jack yard twice the main breadth, gives 36 feet diameter in the slings;  $\frac{3}{8}$  on an inch to the foot of main breadth, gives  $6\frac{3}{4}$  inches; diameter at the yard arms  $3\frac{1}{2}$  inches, length of the top-sail yard  $1\frac{1}{2}$  of main breadth, gives 27 feet diameter in the slings, same as lower yard; diameter at the arms  $3\frac{3}{8}$  inches, topgallant yard's length as the main breadth 18 feet; diameter in the sling;  $\frac{1}{4}$  inch to the foot of main breadth, gives  $4\frac{1}{2}$  inches, diameter at the yard arm  $2\frac{1}{4}$  inch, royal yard's length  $\frac{2}{3}$  of the topgallant yard, diameter  $\frac{2}{3}$ ; length of the mizzen mast  $1\frac{1}{4}$  of the main breadth, gives 31 feet 6 inches from the deck to the head,  $\frac{1}{5}$  of which is for the head, gives 6 feet; diameter in the deck  $\frac{1}{2}$  inch to the foot of main breadth, gives 9 inches;  $\frac{1}{8}$  less at the hounds, gives  $7\frac{7}{8}$  inches diameter; above,  $6\frac{7}{8}$  inches; diameter at the head, 6 inches; length of the mizzen topmast  $1\frac{1}{2}$  of the main breadth, gives 27 feet, of which 4 feet is for the pole head; diameter at the cap  $\frac{5}{16}$  of an inch to the foot of main breadth, gives  $5\frac{5}{8}$  inches, at the head 5 inches, pole head 4 inches by 3 inches; length of the mizzen boom, the main breadth, gives 18 feet diameter at the sheet;  $\frac{5}{16}$  of an inch to the main breadth, gives  $5\frac{5}{8}$  inches diameter, outer end  $\frac{1}{8}$  less 5 inches, inner end  $4\frac{1}{4}$  inches; length of the gaff  $\frac{3}{4}$  of the main breadth, gives 13 feet 6 inches; diameter 3 feet from the mast,  $\frac{1}{4}$  of an inch to the foot of main breadth, gives  $4\frac{1}{2}$  inches, outer end  $3\frac{1}{2}$  inches. Length of a running bowsprit twice the main breadth, gives 36 feet; diameter in the

bed,  $\frac{5}{8}$  of an inch to the foot of main breadth, gives  $11\frac{1}{4}$  inches; outer end  $\frac{1}{8}$  less gives  $9\frac{7}{8}$  inches. Should a ketch about to be masted be either more or less in breadth than this given rule, the masts and yards are to be produced for her by working from the above their lengths and diameters by the rule of three, or by referring to the table.

*Rules for Masting a Cutter or Smack.*

To mast a cutter or smack, whose main breadth is 20 feet, let the lower mast be from the deck to the head  $2\frac{1}{4}$  of the main breadth, which gives 55 feet; of which  $\frac{1}{6}$  is for the head of the mast, gives 9 feet 2 inches; to which add the depth in the hold, say 11 feet, gives the extreme length 66 feet; diameter in the deck  $\frac{1}{16}$  of an inch to the foot of main breadth, gives  $16\frac{1}{4}$  inch; diameter at the hounds  $\frac{1}{8}$  less, gives  $14\frac{1}{8}$  inches; diameter above the hounds  $\frac{1}{8}$  less, gives  $12\frac{3}{8}$  inches; diameter at the head  $\frac{1}{8}$  less, gives 11 inches. Length of the top-mast twice the main breadth, gives 40 feet, of which 5 feet is for the pole head; diameter in the cap  $\frac{1}{2}$  the diameter of the lower mast in the deck, gives  $8\frac{1}{8}$  inches;  $\frac{1}{8}$  less at the head, gives  $7\frac{1}{8}$  inches; lower end of the pole  $\frac{1}{8}$  less, gives 6 inches, head  $4\frac{1}{2}$  inches. Length of the main boom  $2\frac{1}{4}$  of the main breadth, gives 45 feet; diameter at the sheet  $\frac{1}{2}$  inch to the foot of main breadth, gives 10 inches; outer end  $\frac{1}{8}$  less, gives  $8\frac{1}{4}$  inches; inner end  $\frac{1}{4}$  less, gives  $7\frac{1}{2}$  inches. Length of the gaff  $1\frac{3}{4}$  of the main breadth, gives 35 feet, diameter 4 feet from the mast;  $\frac{5}{16}$  of an inch to the foot of main

breadth, gives  $6\frac{1}{4}$  inches;  $\frac{2}{3}$  for the outer end, gives  $4\frac{1}{8}$  inches. Length of the cross-jack yard  $2\frac{1}{4}$  of the main breadth, gives 45 feet; diameter in the slings  $\frac{5}{16}$  of an inch to the foot of main breadth, gives  $6\frac{1}{4}$  inches; outer ends  $\frac{2}{3}$ , gives  $4\frac{1}{8}$  inches. Length of the bowsprit  $2\frac{1}{4}$  of the main breadth, gives 45 feet diameter in the bed;  $\frac{5}{8}$  of an inch to the foot of main breadth, gives  $12\frac{1}{2}$  inches; outer end  $\frac{1}{8}$  less, gives 11 inches. Yachts, or vessels for despatch, may add to the length of the bowsprit, cross-jack yard, and topmast,  $\frac{1}{4}$  of the main breadth, if needful, the diameter will be the same. Trestletrees, their lengths three times the diameter of the mast at the hounds; crosstrees, half the main breadth for their length.

*Rules for making Studding Sail Booms.*

Their length half the length of the yard they lay on, excepting the lower ones, those are from 2 to 4 feet longer than half the yard on which they rest; diameter at the boom iron the same as the end of the yard on which they lay; diameter at the outer end  $\frac{2}{3}$  of the main diameter.

Having, by the foregoing rules, produced the masts and yards of every description of vessels, thereby vessels of every size may be properly masted. Fancy or local circumstances may cause a little variation in the length of some of the spars, such as the top-gallant-yards, jibboom, or indeed any other spar; if masters of vessels should think it prudent or necessary, this may be done, without in any way altering the principle on

which this little work is founded. In reference to the heads of all lower-masts, which generally have a stop or shoulder at the hounds to receive the trestletrees, and which is given throughout this work, yet it frequently weakens the mast-head; besides, from the water passing down between, it enters the end grain of the wood, and causes decay. I, therefore, would recommend, where the stick will admit, that all lower-masts should be lined straight from the hounds to the head, with little or no stop or shoulder, particularly the fore and aft way. Again, at the stop of all lower-yards, that part where the sheave holes are cut should be left square, and the fore and aft way lined a little larger than the given rule, to add to the strength of the yard in that place; in like manner the hounds of top-mast and top-gallant-mast are to be left a little larger, and to remain eight square, to give strength in the wake of the sheave hole.

On the same principle we now proceed to give the length and dimensions of the cheeks, trestletrees, cross-trees, bolsters, tops, caps, bees, &c.

Length of the cheeks.—The common length is  $\frac{1}{3}$  of the length of the mast-head, to which they may be fixed; but should the top-mast be lifted with a patent screw fid, in that case it would be advisable to have the cheeks half the length of the mast-head; their thickness one inch in four of the given diameter of the mast at the hounds, that is, if the diameter of the mast at the hounds is 12 inches, the cheeks are to be 3 inches in thickness, their breadth  $\frac{1}{4}$  more than the diameter of the mast, to be fastened by from 4 to 6 bolts, from  $\frac{1}{2}$



inch to  $\frac{7}{8}$  of an inch, agreeable to the size of the mast, to be flat headed, and well clenched; sometimes a clasp hoop is fixed round the lower part of the cheeks, about a foot up from the points.

**Trestletrees.**—Their length: to every inch diameter of the mast at the hounds add 5 inches as the length, that is, if the diameter of the mast at the hounds is 14 inches, multiply this by 5, gives the length of the trestletrees 70 inches, or 5 feet 10 inches; depth half the diameter of the mast, which in this case, would be 7 inches; the breadth  $\frac{1}{3}$  of the mast, and gives  $4\frac{2}{3}$  inches; the mid length of the trestletrees to be fixed on the centre, fore and aft of the mast; they are rounded off the up and down way, and sneaped on the under side  $\frac{1}{3}$  of their depth, and about 12 inches on each end, with a broad chamfered on the out side lower edge. Trestletrees have generally a score of half inch or  $\frac{3}{4}$  taken out, with a stop butt in the mast to keep them in place. Care should be taken to drop these fore ends agreeable to the rake of the mast, that the tops may range fore and aft parallel with the sheer of the vessel, (for nothing takes the eye sooner than one top sticking up and the other down.) Trestletrees are bolted through the mast with two bolts, from  $\frac{5}{8}$  to  $\frac{7}{8}$  of an inch diameter, well headed and clenched.

**Crosstrees.**—Their length one half of the main breadth after deducting therefrom  $\frac{1}{12}$ , that is, if the vessel is 24 feet broad, by deducting  $\frac{1}{12}$ , the remainder is 22 feet, therefore 11 feet is the length of the main after crosstrees; the length of those before the mast must be governed by the form of the top. Sometimes there

are only two that ranges across, that is one at the after ends of the trestletrees, the other the foreside of the mast, between the mast and top-mast, the one between, which take the middle top-mast shroud, are half cross-trees. But the best way is to have three whole cross-trees: the after one 3 inches from the ends of the trestletrees, the next close to the after part of the mast, the third between the lower-mast and top-mast, with a short one to support the fore end of the top, the after part of which secures the heel of the top-mast. The breadth of the crosstrees the same breadth as the trestletrees, which is  $4\frac{3}{8}$  inches; the depth half the depth of the trestletrees, which will be  $3\frac{1}{2}$  inches; to be reduced on the under side  $\frac{3}{5}$  of their depth, commencing at  $\frac{1}{3}$  of their length; to be let down with a score in the trestletrees  $\frac{2}{5}$  of their depth, and a score in the crosstrees  $\frac{1}{5}$  of their depth let on the trestletrees, with a stop butt to prevent their springing. Bolts of  $\frac{1}{2}$  inch to  $\frac{3}{4}$  inch, with flat heads, are driven down through the crosstrees, and forelocked on a ring the under side of the trestletrees; a small bolt is driven fore and aft, and clenched without the hole for the futtock plates to prevent the crosstrees from splitting; the foremost crosstrees are to be  $\frac{1}{2}$  short of the main.

Tops.—Their length and breadth are governed by the length of the trestletrees and crosstrees, so also is their position at the mast, that is, the mid length fore and aft to be at the middle line of the mast; the form as to the round is a mere matter of opinion; the neatest tops are those which commence the round at  $\frac{1}{4}$  of the length of the top, fore and aft; open or batten tops,



which are the neatest, are made by forming them on a floor in chalk, to which a rim of  $\frac{3}{4}$  or one inch elm or oak board, 6 or 7 inches wide, is laid to the form of the top, this is carried round and scarphed into each other, on which round the outer edge a fir cant is nailed of  $1\frac{1}{2}$  inches deep, and 2 inches in breadth, with a broad chamfer on the inside edge, to this rim and cant an elm batten of  $\frac{3}{8}$  of an inch in thickness, and  $2\frac{1}{2}$  inches deep, is nailed, which forms the outer boundary of the top, (excepting at the after part.) Sometimes there is no batten, the rim and cant form the edge; at the after part of the top a board of elm or oak, of an inch thick and 5 inches broad, is laid on the cant, with a few blocks of  $1\frac{1}{2}$  inch fir laid underneath, to which this board is nailed; the after part being kept well with the after part of the top; through this board and the rim under, mortices are cut to support and secure the stanchions, on which the hand rail of the top is morticed into; against this board and rim, at the after part of the top, a facing board is nailed of from 5 to 6 inches in breadth, in length the breadth of the top. Sometimes it is in the shape of an anchor stock, at other times rounded down at the ends about one inch from the middle; the out boundaries of the top being prepared, line off the size of the centre hole, which athwartships may be  $\frac{2}{3}$  of the breadth of the top, to this breadth lay a batten each side, the length of the top the same thickness and breadth as the rim, into which they are to be fastened down and nailed; into those fore and aft battens others of the same size and thickness are to be let, one fore side of the top-mast, the other the aft side of

the mast, sufficiently apart to clear the rigging aft and the stay forward ; the outer parts, from those battens to the rim, are formed into gratings, with battens of elm board  $\frac{3}{4}$  thick and 3 inches in breadth. Care should be taken that those battens are not kept so far apart as to permit the heel of a man's shoe to pass down. Those tops are secured to the crosstrees by 4 or 6 small flat headed bolts, and forelocked under on a ring. Tops are often made by forming a rim, which is nailed to the crosstrees, and boarded fore and aft between ; the former, although a little more expensive, is the best and cheapest in the end. If there are futtock plates, it is usual to have a square iron plate let down in the rim of the top, in which there is a hole to admit the futtock plate ; if the top-mast rigging passes through the top and crosstrees, there is no occasion for plates.

Caps for lower-masts are generally made of elm. In depth the same as the trestletrees ; in breadth  $\frac{2}{5}$  more than the diameter of the mast at the head ; in length, fore and aft, 3 times the diameter of the mast head ;  $\frac{1}{5}$  of the depth to be rounded on the upper part for neatness, and to prevent the water lodging ; they are square the under side, and rounded at each end, with an iron strop, let in its thickness from the under side, and driven up tight, secured with a small bolt through the middle, and well clenched, with a few nails at each end. Sometimes the strop is let on in a groove, and bent round hot ; in this case they are open at the aft side. This is not so well as when the strop is driven on as a hoop. The square hole or mortice, that receives the head of the mast, is cut  $\frac{3}{4}$  of the diameter of the mast-head ; a

piece of lead nailed on the cap over the mast-head, painted under, preserves the mast from the weather. The circular hole for the top-mast to be a little larger than the top-mast, to receive the leather casing on the inside, to prevent the top-mast from chaffing, to be set foreward sufficiently to admit the heel of the top-mast to pass up clear of the rigging, otherwise the lower-mast and top-mast will not form a straight line.

Bolsters are pieces of fir faid to the mast, and nailed on the trestletrees; on them the rigging rest, the form a quarter of a circle, are a little broader than the trestletrees, and in length from 6 to 8 inches more than the diameter of the mast.

Bowsprit caps are made in thickness and breadth the same as the fore cap; in length it is to be 4 times the diameter of the bowsprit, to admit the mortice and the circular hole for the jibboom to be cut raking, to conform with the stive of the bowsprit; the ends are rounded, and strapt with iron, in like manner with other caps.

Bees are those cleats or blocks bolted to the outer end of the bowsprit, on each side faid home and levelled to the rake of the cap, for the purpose of receiving the top-mast stays; in length twice the diameter of the bowsprit, and half the diameter for the depth; the breadth is governed by the size of the stay. Sometimes they have shivers in them, but a half shiver or only a round hole is sufficient.

Top-mast trestletrees: to every inch diameter of the mast at the hounds, let the trestletrees be 4 inches in length, in depth  $\frac{1}{2}$  the diameter of the top-mast, in

breadth  $\frac{1}{3}$ . To prevent the wounding of the mast, it would be advisable to frame the trestletrees with two chocks, crosswise, of  $2\frac{1}{2}$  or 3 inches in thickness; let into the trestletrees  $\frac{1}{2}$  inch, one chock on the fore side of the top-mast, the other the aft side, so as to go tight over the mast head through the trestletrees and chocks; a flat headed bolt is driven and well clenched, they are sneaped under, and their ends rounded. Sometimes there are sheave holes cut in the fore ends of the main trestletrees to receive the fore-top-gallant braces, and the after ends of the fore trestletrees to receive the main-top-gallant braces.

Top-mast crosstrees in length one half of the lower crosstrees; in breadth, the same as the trestletrees; depth,  $\frac{2}{3}$  of the depth; their form,  $\frac{1}{3}$  of the length to be straight athwartships, from thence to round aft from 2 to 4 inches, or half the diameter of the top-gallant-mast, agreeable to their length; they are reduced on the under side  $\frac{1}{3}$  of their thickness, commencing at  $\frac{1}{3}$  of their length. They may be tapered a little sideways, the after one fixed 2 inches from the after end of the trestletrees, the fore one the fore side of the top-gallant-mast, to be let down  $\frac{2}{3}$  of their depth,  $\frac{2}{3}$  in the trestletrees, and  $\frac{1}{3}$  in the crosstrees, with a stop butt to prevent their splitting, to be secured by flat headed bolts through the trestletrees, and forelocked on a ring underneath; the holes in the ends, to receive the top-gallant-rigging, are to be 3 inches within the ends, and a small square hoop driven on their outer end to prevent their splitting. In large ships there are 3 top-mast crosstrees, in that case the middle one will be between the head of the

top-mast and top-gallant-mast. Top-mast bolsters, their length, breadth, and form are taken from the head of the top-mast, after the same manner as the lower bolsters are.

Top-mast caps in depth the same as the trestletrees, in breadth  $\frac{2}{3}$  more than the diameter of the top-mast head, and in length 3 times the diameter of the mast head; the mortice that lets over the mast head  $\frac{1}{4}$  of the mast head, the round hole for the top-gallant-mast of sufficient size to permit the top-gallant-mast to pass up with ease; to be forward sufficiently to give room for the rigging; to be rounded at the ends and on the upper side like unto the lower caps, and braced with an iron hoop after the same manner as the lower caps; the top-gallant caps are often made of iron, but if made of wood their proportions are taken in like manner as those of the top-mast.

If the head of the top-gallant-mast is fixed with trestletrees and crosstrees, (which is now almost superseded by sliding gunters,) they are framed in like manner as the top-mast trestletrees; their length 3 inches to every inch diameter of the top-gallant-mast at the hounds,  $\frac{1}{2}$  the diameter for the depth, and  $\frac{1}{3}$  for their breadth. The crosstrees are generally of iron, and in length half of those of the top-mast, passing through holes in the trestletrees, with eyes in each end to receive the rigging; sometimes they are flatted, and let down on the trestletrees.

Fids for top-masts and top-gallant-masts, if of wood, their size, fore and aft,  $\frac{1}{3}$  the diameter of the mast, up and down  $\frac{1}{3}$  more; their length, from out to out of the

trestletrees ; if fitted with patent iron screw fids, the hole in the heel of the top-mast should be cut to conform to the iron fid.

Sheaves or half sheaves in the heel of the top-mast or top-gallant-mast, for the top rope, are fixed above the fid hole twice the diameter of the mast to which they are fitted ; the thickness of the sheave  $\frac{1}{8}$  of an inch to one inch of the diameter of the mast in the fid. Those sheave holes are often cut athwartships, but the best way is to cut them at the right squaring.

The four following tables give the lengths and diameters of all masts and yards belonging to every size of square rigged vessels, from 15 feet to 32 feet 6 inches extreme breadth.

Table No. I. gives the length of the lower mast from the deck to the head, from which deduct  $\frac{1}{2}$  for the head, to which add the depth from the deck to the step, as follows :—Get the main breadth of the vessel about to be masted, look at the table for that breadth under the heading of main breadth, against which is the reduced breadth ; in which column is shown the length of the main-mast, with its diameter in the deck ; the length of the main-top-mast, with its diameter in the fid ; the length of the top-gallant-mast, with and without the royal-mast, with their diameters in the fid. Having procured the length and diameters of the main-mast, &c., take the reduced main breadth, and look down the column under the heading of extreme breadth, against which will be seen the reduced breadth, through which is shown the length and diameter in the deck of the foremast, (by adding the length from the deck to



the step,) the fore-top-mast, top-gallant-mast, &c. If the vessel is a ship, deduct  $\frac{1}{3}$  of the given length of the fore-mast, against which is shown the length and diameter of the mizzen-mast, mizzen-top-mast, and top-gallant-mast; if the vessel is a barque, deduct  $\frac{1}{7}$  from the length of the main-mast. At the column for this length will be shown the length and diameter of her mizzen-mast; the top-mast, being of another description, must either be worked by the rule of three from the top-mast of the barque first described, or take it from the table of cutters' mast, which length and diameter of the lower-mast are the same. As an example or two may show it more clear, take the following:—Suppose the vessel's extreme breadth to be 26 feet, by taking  $\frac{1}{12}$  therefrom shows the reduced breadth to be 23 feet 10 inches, which gives the length of the main-mast, from the deck to the head, 47 feet 8 inches, and the diameter in the deck 18 inches, 23 feet 10 inches being  $\frac{1}{12}$  less than the main breadth. To find for the fore-mast, look under the heading of main breadth for 23 feet 10 inches; 24 feet is the nearest to it, which gives 44 feet the length of the fore-mast from deck to head, and  $16\frac{1}{2}$  inches its diameter in the deck, for which the length of the top-mast is 33 feet, diameter in the fid 11 inches; length of the top-gallant, without the pole, 16 feet 6 inches, diameter in the fid  $5\frac{1}{2}$  inches, &c. To find the length of the mizzen-mast, if a barque, deduct  $\frac{1}{7}$  from 47 feet 8 inches, which is the length of the main-mast, gives 41 feet; one quarter less than the diameter of the main-mast gives  $13\frac{1}{2}$  inches, which is the diameter of the mizzen-mast in the deck. To find

the quarterings for making, look for  $13\frac{1}{2}$  inches under the heading of diameter in the deck, in table No. III., against which are the settings off for linning the mizzen-mast. The mizzen-mast of a ship is produced by taking  $\frac{1}{7}$  from the fore-mast ; the quarterings of bowsprits are taken from the same table, by looking for their diameter under the same heading.



TABLE No. I.

Length & diameter of lower-mast.				Top-mast.		Top-gallant-mast		Top-gallant-mast, with royal and pole head.						
Extreme breadth of the vessel.	Reduced breadth.	Length of the mast from deck to head	Diameter in the deck.	Length of the top-mast	Diameter in the fid.	Length of top-gallant-mast, with head.	Diameter in the fid.	Length of top-gallant-mast without head.	Diameter in the fid.	Length of royal-mast.	Diameter at the heel.	Diameter at the head.	Length of the pole.	Diameter.
ft. in.	ft. in.	ft. in.	in.	ft. in.	in.	ft. in.	in.	ft. in.	in.	ft. in.	in.	in.	ft. in.	in.
32 6	30 0	60 0	22 $\frac{1}{2}$	45 0	15	22 6	7 $\frac{1}{2}$	19 0	7 $\frac{1}{2}$	12 8	5 $\frac{3}{4}$	5	6	3
32 0	29 6	59 0	22 $\frac{1}{8}$	44 3	14 $\frac{3}{4}$	22 0	7 $\frac{1}{2}$	18 5	7 $\frac{1}{2}$	12 3	5 $\frac{5}{8}$	5	6	3
31 6	29 0	58 0	21 $\frac{1}{2}$	43 6	14 $\frac{1}{2}$	21 9	7 $\frac{1}{4}$	18 1	7 $\frac{1}{4}$	12 0	5 $\frac{1}{2}$	4 $\frac{7}{8}$		
31 0	28 6	57 0	21 $\frac{1}{4}$	42 9	14 $\frac{1}{4}$	21 4	7 $\frac{1}{8}$	17 9	7 $\frac{1}{8}$	11 11	5 $\frac{3}{4}$	4 $\frac{1}{2}$		
30 6	28 0	56 0	21	42 0	14	21 0	7	17 6	7	11 10	5 $\frac{1}{4}$	4 $\frac{3}{4}$		
30 0	27 6	55 0	20 $\frac{5}{8}$	41 3	13 $\frac{1}{2}$	20 7	6 $\frac{7}{8}$	17 3	6 $\frac{7}{8}$	11 9	5 $\frac{1}{8}$	4 $\frac{1}{2}$		
29 6	27 0	54 0	20 $\frac{1}{2}$	40 6	13 $\frac{1}{4}$	20 3	6 $\frac{3}{4}$	17 0	6 $\frac{1}{4}$	11 8	5	4 $\frac{3}{8}$		
29 0	26 6	53 0	20	39 9	13 $\frac{1}{4}$	19 10	6 $\frac{1}{2}$	16 9	6 $\frac{1}{2}$	11 4	4 $\frac{7}{8}$	4 $\frac{1}{4}$		
28 6	26 2	52 4	19 $\frac{1}{2}$	39 3	13	19 7	6 $\frac{1}{4}$	16 6	6 $\frac{1}{4}$	11 0	4 $\frac{1}{2}$	4 $\frac{1}{8}$		
28 0	25 8	51 4	19 $\frac{1}{4}$	38 6	12 $\frac{3}{4}$	19 3	6 $\frac{3}{8}$	16 3	6 $\frac{3}{8}$	11 0	4 $\frac{1}{2}$	4		
27 6	25 2	50 4	18 $\frac{3}{4}$	37 9	12 $\frac{1}{2}$	18 10	6 $\frac{1}{4}$	16 0	6 $\frac{1}{4}$	10 8	4 $\frac{1}{2}$	3 $\frac{7}{8}$		
27 0	24 9	49 6	18 $\frac{1}{2}$	37 0	12 $\frac{1}{4}$	18 6	6 $\frac{1}{8}$	15 9	6 $\frac{1}{8}$	10 6	4 $\frac{1}{2}$	3 $\frac{3}{4}$	6	
26 6	24 3	48 6	18 $\frac{1}{4}$	36 4	12 $\frac{1}{8}$	18 2	6 $\frac{1}{16}$	15 6	6 $\frac{1}{16}$	10 4	4 $\frac{1}{4}$	3 $\frac{5}{8}$	6	
26 0	23 10	47 8	18	35 9	12	17 10	6	15 3	6	10 1	4 $\frac{3}{16}$	3 $\frac{1}{2}$	6	3

TABLE No. I. continued.

25 6	23 4	46 8	17 $\frac{3}{4}$	35 3	11 $\frac{3}{4}$	17 7	51 $\frac{3}{4}$	15 0	51 $\frac{3}{4}$	10 0	4 $\frac{1}{8}$	3 $\frac{1}{2}$	6 6	3 3
25 0	22 11	45 10	17 $\frac{1}{4}$	34 4	11 $\frac{1}{4}$	17 2	5 $\frac{3}{4}$	14 9	5 $\frac{3}{4}$	10 0	4 $\frac{1}{16}$	3 $\frac{7}{16}$	6 6	3 3
24 6	22 6	45 0	17	33 9	11 $\frac{1}{2}$	16 10	5 $\frac{5}{8}$	14 6	5 $\frac{5}{8}$	9 9	4	3 $\frac{5}{8}$	6 6	3 3
24 0	22 0	44 0	16 $\frac{1}{2}$	33 0	11	16 6	5 $\frac{1}{2}$	14 3	5 $\frac{1}{2}$	9 6	3 $\frac{15}{16}$	3 $\frac{3}{4}$	6 6	3 3
23 6	21 6	43 0	16 $\frac{1}{8}$	32 3	10 $\frac{1}{2}$	16 1	5 $\frac{3}{8}$	14 0	5 $\frac{3}{8}$	9 4	3 $\frac{3}{16}$	3 $\frac{3}{16}$	6 6	3 3
23 0	21 1	42 2	15 $\frac{3}{4}$	31 6	10 $\frac{1}{4}$	15 9	5 $\frac{1}{4}$	13 9	5 $\frac{1}{4}$	9 2	3 $\frac{1}{4}$	3 $\frac{1}{8}$	5 $\frac{1}{2}$	2 $\frac{1}{4}$
22 6	20 8	41 4	15 $\frac{1}{2}$	31 0	10 $\frac{1}{2}$	15 6	5 $\frac{1}{8}$	13 6	5 $\frac{1}{8}$	9 0	3 $\frac{1}{16}$	3 $\frac{1}{16}$	5 $\frac{1}{2}$	2 $\frac{1}{4}$
22 0	20 2	40 4	15 $\frac{1}{4}$	30 0	10	15 0	5	13 3	5	8 10	3 $\frac{1}{2}$	3	5 $\frac{1}{2}$	2 $\frac{1}{4}$
21 6	19 9	39 6	14 $\frac{7}{8}$	29 8	9 $\frac{7}{8}$	14 10	5	13 0	5	8 8	3 $\frac{5}{16}$	3	5	2 $\frac{1}{4}$
21 0	19 3	38 6	14 $\frac{1}{2}$	29 0	9 $\frac{5}{8}$	14 6	4 $\frac{7}{8}$	12 9	4 $\frac{7}{8}$	8 6	3 $\frac{1}{4}$	3	5	2 $\frac{1}{4}$
20 6	18 10	37 8	14 $\frac{1}{4}$	28 3	9 $\frac{3}{8}$	14 1	4 $\frac{3}{8}$	12 6	4 $\frac{3}{8}$	8 4	3 $\frac{1}{4}$	3	5	2 $\frac{1}{4}$
20 0	18 4	36 8	13 $\frac{7}{8}$	27 6	9 $\frac{1}{8}$	13 10	4 $\frac{5}{8}$	12 3	4 $\frac{5}{8}$	8 2	3 $\frac{1}{4}$	3	5	2 $\frac{1}{4}$
19 6	17 11	35 10	13 $\frac{1}{2}$	27 0	9	13 6	4 $\frac{1}{2}$	12 0	4 $\frac{1}{2}$	8 0	3 $\frac{1}{4}$	3	5	2 $\frac{1}{4}$
19 0	17 5	35 0	13 $\frac{1}{8}$	26 3	8 $\frac{3}{4}$	13 1	4 $\frac{1}{8}$	11 9	4 $\frac{1}{8}$	7 10	3 $\frac{1}{16}$	3	5	2 $\frac{1}{4}$
18 6	17 0	34 0	12 $\frac{3}{4}$	25 6	8 $\frac{1}{2}$	12 9	4 $\frac{1}{4}$	11 6	4 $\frac{1}{4}$	7 8	3 $\frac{1}{8}$	2 $\frac{3}{8}$	4 $\frac{1}{2}$	2 $\frac{1}{4}$
18 0	16 6	33 0	12 $\frac{1}{2}$	24 9	8 $\frac{1}{4}$	12 4	4 $\frac{1}{4}$	11 3	4 $\frac{1}{4}$	7 5	3	2 $\frac{3}{4}$	4 $\frac{1}{2}$	2 $\frac{1}{4}$
17 6	16 0	32 0	12 $\frac{1}{4}$	24 0	8	12 0	4	11 0	4	7 4	3	2 $\frac{3}{4}$	4 $\frac{1}{2}$	2 $\frac{1}{4}$
17 0	15 7	31 2	12	23 4	7 $\frac{3}{4}$	11 8	4	10 9	4	7 2	3	2 $\frac{3}{4}$	4 $\frac{1}{2}$	2 $\frac{1}{4}$
16 6	15 2	30 4	11 $\frac{3}{4}$	22 9	7 $\frac{1}{2}$	11 4	3 $\frac{7}{8}$	10 6	3 $\frac{7}{8}$	7 0	3	2 $\frac{3}{4}$	4 $\frac{1}{2}$	2 $\frac{1}{4}$
16 0	14 8	29 4	11 $\frac{1}{2}$	22 3	7 $\frac{1}{4}$	11 2	3 $\frac{5}{8}$	10 3	3 $\frac{5}{8}$	6 10	3	2 $\frac{3}{4}$	4 $\frac{1}{2}$	2 $\frac{1}{4}$
15 6	14 3	28 6	11 $\frac{1}{4}$	21 6	7 $\frac{1}{8}$	10 9	3 $\frac{3}{8}$	10 0	3 $\frac{3}{8}$	6 8	3	2 $\frac{3}{4}$	4 $\frac{1}{2}$	2 $\frac{1}{4}$
15 0	13 9	27 6	11	20 8	7 $\frac{1}{8}$	10 4	3 $\frac{1}{8}$	9 9	3 $\frac{1}{8}$	6 6	3	2 $\frac{3}{4}$	4 $\frac{1}{2}$	2 $\frac{1}{4}$

TABLE No. II.

Gives the length of the mast from deck to head, from which the lengths and the diameters in the slings and arms of all yards are produced.

Length of the mast from deck to head.	Length of the lower yard.		Diameter in the slings.	Diameter at the yard arm.	Length of the top sail yard.		Diameter in the slings.	Diameter at the yard arm.	Length of the top gallant yard.		Diameter in the slings.	Diameter at the yard arm.	Length of the royal yard.		Diameter in the slings.	Diameter at the yard arm.
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
60	0	60	0	15	45	0	10	5	30	0	7 $\frac{1}{2}$	3 $\frac{3}{4}$	20	0	5	2 $\frac{1}{2}$
59	0	59	0	14 $\frac{3}{4}$	44	3	9 $\frac{3}{4}$	5	29	6	7 $\frac{3}{8}$	3 $\frac{3}{4}$	19	9	5	2 $\frac{1}{4}$
58	0	58	0	14 $\frac{1}{2}$	43	6	9 $\frac{5}{8}$	4 $\frac{7}{8}$	29	0	7 $\frac{1}{4}$	3 $\frac{5}{8}$	19	6	4 $\frac{1}{4}$	2 $\frac{3}{8}$
57	0	57	0	14 $\frac{1}{4}$	42	9	9 $\frac{1}{2}$	4 $\frac{3}{4}$	23	6	7 $\frac{1}{8}$	3 $\frac{9}{16}$	19	0	4 $\frac{3}{4}$	2 $\frac{5}{8}$
56	0	56	0	14	42	0	9 $\frac{1}{4}$	4 $\frac{5}{8}$	28	0	7	3 $\frac{1}{2}$	18	8	4 $\frac{1}{2}$	2 $\frac{5}{16}$
55	0	55	0	13 $\frac{3}{4}$	41	3	9 $\frac{1}{8}$	4 $\frac{1}{2}$	27	6	6 $\frac{7}{8}$	3 $\frac{1}{2}$	18	4	4 $\frac{1}{2}$	2 $\frac{1}{4}$
54	0	54	0	13 $\frac{1}{2}$	40	6	9	4 $\frac{1}{2}$	27	0	6 $\frac{3}{4}$	3 $\frac{5}{8}$	18	0	4 $\frac{1}{2}$	2 $\frac{1}{4}$
53	0	53	0	13 $\frac{1}{4}$	39	9	8 $\frac{7}{8}$	4 $\frac{1}{2}$	26	6	6 $\frac{5}{8}$	3 $\frac{5}{16}$	17	8	4 $\frac{3}{8}$	2 $\frac{3}{16}$
52	4	52	4	13	39	3	8 $\frac{5}{8}$	4 $\frac{1}{16}$	26	2	6 $\frac{1}{2}$	3 $\frac{1}{4}$	17	4	4 $\frac{3}{8}$	2 $\frac{3}{16}$
51	4	51	4	12 $\frac{3}{4}$	38	6	8 $\frac{1}{2}$	4 $\frac{1}{4}$	25	8	6 $\frac{3}{8}$	3 $\frac{3}{16}$	17	0	4 $\frac{1}{4}$	2 $\frac{1}{8}$
50	4	50	4	12 $\frac{1}{2}$	37	9	8 $\frac{3}{8}$	4 $\frac{3}{16}$	25	2	6 $\frac{1}{4}$	3 $\frac{1}{8}$	16	8	4 $\frac{1}{8}$	2 $\frac{1}{16}$
49	6	49	6	12 $\frac{1}{4}$	37	0	8 $\frac{1}{8}$	4 $\frac{1}{16}$	24	9	6 $\frac{1}{8}$	3 $\frac{1}{16}$	16	4	4 $\frac{1}{8}$	2 $\frac{1}{16}$
48	6	48	6	12 $\frac{1}{8}$	36	4	8	4	24	3	6 $\frac{1}{8}$	3 $\frac{1}{16}$	16	2	4 $\frac{1}{8}$	2 $\frac{1}{16}$

TABLE No. II. continued.

47	8	47	8	12	6	35	9	8	4	23	10	6	3	15	10	4	2
46	8	46	8	11 $\frac{3}{4}$	5 $\frac{7}{8}$	35	3	7 $\frac{1}{2}$	4	23	4	5 $\frac{7}{8}$	3	15	10	4	2
45	10	45	10	11 $\frac{1}{2}$	5 $\frac{1}{2}$	34	4	7 $\frac{1}{2}$	3 $\frac{13}{16}$	22	11	5 $\frac{3}{4}$	2 $\frac{7}{8}$	15	8	4	2
45	0	45	0	11 $\frac{1}{4}$	5 $\frac{5}{8}$	33	9	7 $\frac{1}{4}$	3 $\frac{3}{4}$	22	6	5 $\frac{1}{2}$	2 $\frac{3}{8}$	15	4	0	2
44	4	44	4	11	5 $\frac{1}{2}$	33	0	7 $\frac{1}{4}$	3 $\frac{5}{8}$	22	0	5 $\frac{1}{2}$	2 $\frac{1}{4}$	14	8	0	1 $\frac{3}{4}$
43	6	43	6	10 $\frac{3}{4}$	5 $\frac{3}{4}$	32	3	7 $\frac{1}{4}$	3 $\frac{9}{16}$	21	6	5 $\frac{1}{2}$	2 $\frac{1}{4}$	14	4	0	1 $\frac{3}{4}$
42	6	42	6	10 $\frac{1}{2}$	5 $\frac{1}{4}$	31	6	7	3 $\frac{1}{2}$	21	1	5 $\frac{3}{8}$	2 $\frac{1}{16}$	14	0	0	1 $\frac{3}{4}$
41	8	41	8	10 $\frac{3}{8}$	5 $\frac{3}{16}$	31	0	6 $\frac{7}{8}$	3 $\frac{7}{16}$	20	8	5 $\frac{1}{8}$	2 $\frac{9}{16}$	14	0	0	1 $\frac{3}{4}$
41	4	41	4	10 $\frac{1}{4}$	5 $\frac{1}{8}$	30	8	6 $\frac{3}{4}$	3 $\frac{3}{4}$	20	4	5 $\frac{1}{8}$	2 $\frac{9}{16}$	14	0	0	1 $\frac{3}{4}$
40	6	40	6	10 $\frac{1}{8}$	5 $\frac{1}{16}$	30	2	6 $\frac{5}{8}$	3 $\frac{5}{16}$	20	2	5	2 $\frac{1}{2}$	13	9	0	1 $\frac{3}{4}$
39	6	39	6	10	5	29	6	6 $\frac{1}{2}$	3 $\frac{1}{4}$	19	9	5	2 $\frac{1}{2}$	13	6	0	1 $\frac{3}{4}$
38	6	38	6	9 $\frac{7}{8}$	4 $\frac{15}{16}$	28	10	6 $\frac{3}{8}$	3 $\frac{3}{16}$	19	4	4 $\frac{7}{8}$	2 $\frac{7}{16}$	13	2	0	1 $\frac{3}{4}$
37	8	37	8	9 $\frac{3}{4}$	4 $\frac{7}{8}$	28	3	6 $\frac{1}{4}$	3 $\frac{1}{8}$	18	10	4 $\frac{3}{4}$	2 $\frac{3}{8}$	13	0	0	1 $\frac{3}{4}$
36	8	36	8	9 $\frac{1}{2}$	4 $\frac{1}{2}$	27	4	6 $\frac{1}{8}$	3 $\frac{1}{16}$	18	4	4 $\frac{5}{8}$	2 $\frac{5}{16}$	12	6	0	1 $\frac{3}{4}$
35	10	35	10	9 $\frac{3}{8}$	4 $\frac{1}{16}$	27	0	6	3	18	0	4 $\frac{1}{2}$	2 $\frac{3}{4}$	12	2	0	1 $\frac{3}{4}$
35	0	35	0	9 $\frac{1}{4}$	4 $\frac{9}{16}$	26	6	6	3	17	6	4 $\frac{3}{8}$	2 $\frac{1}{8}$	12	0	0	1 $\frac{3}{4}$
34	6	34	6	9 $\frac{1}{8}$	4 $\frac{1}{8}$	26	0	5 $\frac{7}{8}$	3	17	4	4 $\frac{3}{8}$	2 $\frac{1}{16}$	12	0	0	1 $\frac{3}{4}$
34	0	34	0	9	4 $\frac{1}{2}$	25	6	5 $\frac{5}{8}$	2 $\frac{13}{16}$	17	0	4 $\frac{1}{4}$	2 $\frac{1}{8}$	12	0	0	1 $\frac{3}{4}$
33	4	33	4	8 $\frac{5}{8}$	4 $\frac{7}{16}$	25	3	5 $\frac{1}{2}$	2 $\frac{3}{4}$	16	6	4 $\frac{1}{8}$	2 $\frac{1}{16}$	12	0	0	1 $\frac{3}{4}$
32	10	32	10	8 $\frac{3}{8}$	4 $\frac{5}{16}$	24	6	5 $\frac{3}{8}$	2 $\frac{1}{16}$	16	2	4 $\frac{1}{8}$	2	12	0	0	1 $\frac{3}{4}$
32	0	32	0	8 $\frac{1}{8}$	4 $\frac{3}{16}$	24	0	5 $\frac{1}{4}$	2 $\frac{5}{8}$	16	0	4	2	12	0	0	1 $\frac{3}{4}$

TABLE No. II. continued.

31	2	31	2	8 $\frac{1}{4}$	4 $\frac{1}{8}$	23	3	5 $\frac{1}{8}$	2 $\frac{9}{16}$	15	8	4	2	
30	6	30	6	8	4	22	8	5	2 $\frac{1}{2}$	15	2	3 $\frac{7}{8}$	2	
30	0	30	0	7 $\frac{7}{8}$	3 $\frac{1}{2}$	22	4	5	2 $\frac{1}{2}$	15	0	3 $\frac{3}{4}$	1 $\frac{7}{8}$	
29	6	29	6	7 $\frac{1}{2}$	3 $\frac{1}{8}$	22	0	4 $\frac{7}{8}$	2 $\frac{7}{16}$	14	11	3 $\frac{3}{8}$	1 $\frac{1}{2}$	
29	0	29	0	7 $\frac{1}{2}$	3 $\frac{3}{4}$	21	4	4 $\frac{1}{2}$	2 $\frac{3}{8}$	14	6	3 $\frac{1}{2}$	1 $\frac{3}{4}$	
28	0	28	0	7 $\frac{1}{4}$	3 $\frac{3}{8}$	20	10	4 $\frac{5}{8}$	2 $\frac{5}{16}$	14	2	3 $\frac{1}{2}$	1 $\frac{3}{4}$	

Table No. III. gives, in the first column, the main diameter in the deck of all lower-masts, and at the fid for top-mast, top-gallant-mast, and royal-mast, from 3 inches to 26 inches diameter; it will, therefore, only require to get the main diameter of any lower-mast, top-mast, &c., for either a ship, barque, brig, schooner, ketch, or cutter, about to be made, look for the size down the column of main diameter, against which is shown the settings off from the middle line at each section or quarter, with the settings off above the hounds and mast head. It will be seen that in quartering the masts there is given a setting off more than is usual given, that is, the first setting off is at the deck, the last at the hounds, between which there are three others; that is, suppose the lower-mast about to be made is 40 feet from deck to the hounds, in which case each division will be 10 feet apart; again, if the top-mast, from the fid to the hounds, is 36 feet, each division will be 9 feet apart, in like manner all masts and top-masts are quartered. In making any masts that may have a sheave hole at their head, it is advisable to swell them out at the hounds  $\frac{1}{4}$  inch on each side to every 10 inches diameter, twice the length of the sheave hole, to give strength to that part wounded by the sheave hole and ~~fun~~ <sup>fun</sup>, which part is left eight

**Top-masts** in the heel are sometimes left square, at other times they are square on the after part, and eight squared on the fore part; sometimes they are left eight square to within one foot of the cap, at other times they are rounded from the fid hole to the hounds. The sheave hole for the top rope at times are cut through on the eighth squaring, at others athwartships; the mortice to receive the sheave for the top rope to be cut one inch to every seven inches diameter at the sheave. Sheave holes, at the heads of the top-masts and top-gallant-masts, are to be cut one inch to every six inches diameter of their respective masts at the hounds; the mortices for sheaves in jibbooms and mainbooms, if required, or any other sheave hole, are to be cut one inch in six inches diameter at the place of the hole.

TABLE No. III.

From the middle line.				Main-mast head.				Top-mast head.			
Main diameter at the deck or 5d.	Settings off at the heel lower-masts	First setting off at the deck or fid	Second settings off.	Third settings off.	Fourth settings off.	Settings off at the hounds.	At the head.	Settings off above the hounds.	Setting off at the hounds.	Settings off at the hounds.	Setting off at the hounds.
in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
3	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{7}{16}$	1 $\frac{7}{16}$	1 $\frac{3}{8}$	1 $\frac{5}{16}$					
3 $\frac{1}{2}$	1 $\frac{3}{8}$	1 $\frac{3}{4}$	1 $\frac{11}{16}$	1 $\frac{11}{16}$	1 $\frac{7}{8}$	1 $\frac{7}{8}$					
4	1	2	1 $\frac{13}{16}$	1 $\frac{13}{16}$	1 $\frac{15}{16}$	1 $\frac{7}{4}$					
4 $\frac{1}{2}$	1	2 $\frac{1}{4}$	2 $\frac{3}{16}$	2 $\frac{3}{8}$	2	1 $\frac{15}{16}$					





Table No. IV. gives in the first column the main diameter of all yards in the slings, from 3 inches to 16 inches. It is only required to get the main diameter of the yard in the slings; look for it down the column of main diameter, against which is shewn the settings off from the middle line of each section or quartering. The yards are quartered in like manner as the masts; that is, there are five settings off, including the slings and the yard-arm. Lower yards swell a little at the sheave hole for the topsail sheet, and are always left square twice the length of the sheave hole; sometimes the lower yards are left eight square in the middle,  $\frac{1}{4}$  of the length of the yard.

TABLE No. IV.

*From the middle line.*

Main diameter in the slings.	Setting off at the slings.	Setting off at the first quarter.	Setting off at the second quarter.	Setting off at the third quarter.	Setting off at the yard arm.
in.	in.	in.	in.	in.	in.
3	$1\frac{1}{2}$	$1\frac{7}{16}$	$1\frac{3}{16}$	1	$\frac{3}{4}$
$3\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{5}{8}$	$1\frac{7}{16}$	$1\frac{3}{16}$	$\frac{7}{8}$
4	2	$1\frac{7}{8}$	$1\frac{11}{16}$	$1\frac{3}{8}$	1
$4\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$1\frac{7}{8}$	$1\frac{9}{16}$	$1\frac{1}{8}$
5	$2\frac{1}{2}$	$2\frac{3}{8}$	$2\frac{1}{8}$	$1\frac{3}{4}$	$1\frac{1}{4}$
$5\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{5}{8}$	$2\frac{3}{8}$	$1\frac{5}{16}$	$1\frac{3}{8}$
6	3	$2\frac{7}{8}$	$2\frac{9}{16}$	$2\frac{1}{8}$	$1\frac{1}{2}$
$6\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{8}$	$2\frac{3}{4}$	$2\frac{1}{4}$	$1\frac{5}{8}$
7	$3\frac{1}{2}$	$3\frac{3}{8}$	$3\frac{1}{16}$	$2\frac{7}{16}$	$1\frac{3}{4}$
$7\frac{1}{2}$	$3\frac{3}{4}$	$3\frac{5}{8}$	$3\frac{1}{4}$	$2\frac{5}{8}$	$1\frac{7}{8}$
8	4	$3\frac{7}{8}$	$3\frac{1}{2}$	$2\frac{11}{16}$	2
$8\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{1}{8}$	$3\frac{11}{16}$	3	$2\frac{1}{8}$
9	$4\frac{1}{2}$	$4\frac{3}{8}$	$3\frac{7}{8}$	$3\frac{3}{16}$	$2\frac{1}{4}$
$9\frac{1}{2}$	$4\frac{3}{4}$	$4\frac{5}{8}$	$4\frac{1}{16}$	$3\frac{3}{8}$	$2\frac{3}{8}$
10	5	$4\frac{7}{8}$	$4\frac{5}{16}$	$3\frac{9}{16}$	$2\frac{1}{2}$



TABLE No. IV. continued.

<i>From the middle line.</i>					
Main diameter in the slings.	Setting off at the slings.	Setting off at the first quarter.	Setting off at the second quarter.	Setting off at the third quarter.	Setting off at the yard arm.
in.	in.	in.	in.	in.	in.
10 $\frac{1}{2}$	5 $\frac{1}{4}$	5 $\frac{1}{8}$	4 $\frac{1}{8}$	3 $\frac{3}{4}$	2 $\frac{5}{8}$
11	5 $\frac{1}{2}$	5 $\frac{3}{8}$	4 $\frac{3}{4}$	3 $\frac{7}{8}$	2 $\frac{3}{4}$
11 $\frac{1}{2}$	5 $\frac{3}{4}$	5 $\frac{9}{16}$	5	4 $\frac{1}{16}$	2 $\frac{7}{8}$
12	6	5 $\frac{13}{16}$	5 $\frac{3}{16}$	4 $\frac{1}{4}$	3
12 $\frac{1}{4}$	6 $\frac{1}{4}$	6	5 $\frac{3}{8}$	4 $\frac{3}{8}$	3 $\frac{1}{8}$
13	6 $\frac{1}{2}$	6 $\frac{1}{4}$	5 $\frac{5}{8}$	4 $\frac{9}{16}$	3 $\frac{1}{4}$
13 $\frac{1}{2}$	6 $\frac{3}{4}$	6 $\frac{1}{2}$	5 $\frac{13}{16}$	4 $\frac{3}{4}$	3 $\frac{3}{8}$
14	7	6 $\frac{3}{4}$	6 $\frac{1}{16}$	4 $\frac{5}{16}$	3 $\frac{1}{2}$
14 $\frac{1}{2}$	7 $\frac{1}{4}$	7	6 $\frac{1}{4}$	5 $\frac{1}{8}$	3 $\frac{5}{8}$
15	7 $\frac{1}{2}$	7 $\frac{1}{4}$	6 $\frac{1}{2}$	5 $\frac{3}{8}$	3 $\frac{3}{4}$
15 $\frac{1}{2}$	7 $\frac{3}{4}$	7 $\frac{1}{2}$	6 $\frac{11}{16}$	5 $\frac{1}{2}$	3 $\frac{7}{8}$
16	8	7 $\frac{3}{4}$	6 $\frac{7}{8}$	5 $\frac{5}{8}$	4
16 $\frac{1}{2}$	8 $\frac{1}{4}$	8	7 $\frac{1}{16}$	5 $\frac{3}{4}$	4 $\frac{1}{8}$

Table No. V. gives the length and diameter of the lower-masts and top-masts of schooners, with their bowsprits standing or running, from 14 feet to 24 feet main breadth; it will, therefore, only require to produce the breadth of the vessel. Look down the column of main breadth, against which is shown the length and diameter of the main-mast, with its top-mast. To find the length and diameter of the foremast, deduct from the main-mast  $\frac{1}{2}$ , viz.:—Suppose the vessel's breadth to be 18 feet 6 inches, the table gives 41 feet 7 inches as the length of the main-mast from deck to head, and the diameter  $13\frac{7}{8}$  inches; from 41 feet 7 inches deduct  $1\frac{1}{2}$ , which gives 38 feet 2 inches the length of the fore-mast, the nearest length in the column is 38 feet 3 inches, the main diameter is  $12\frac{3}{4}$  inches. To find the settings off for lining the mast, see table No. III., which table gives the rule to line all masts and top-masts.

TABLE No. V.

Extreme breadth of the vessel.	Length of the masts from deck to the head.		Diameter in the deck.	Length of the top-mast from the head to the sheave hole.		Length of the pole head.		Length of the top-masts.		Diameter at the fid.	Length of the running bowsprit.		Diameter in the bed.	Length of the standing bowsprit.		Diameter in the bed.
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
14 0	31	6	10 $\frac{1}{2}$	21	0	3	6	24	6	6 $\frac{1}{8}$	22	5	8 $\frac{3}{8}$	19	3	9 $\frac{3}{8}$
14 6	32	7	10 $\frac{3}{4}$	21	9	3	7	25	4	6 $\frac{1}{4}$	23	2	9	20	0	9 $\frac{1}{2}$
15 0	33	9	11 $\frac{1}{4}$	22	6	3	9	26	3	6 $\frac{1}{2}$	24	0	9 $\frac{1}{2}$	20	7	10 $\frac{1}{4}$

TABLE No. V. continued.

15	6	34	10	11 $\frac{5}{8}$	23	3	3	10	27	1	6 $\frac{3}{4}$	24	9	9 $\frac{5}{8}$	21	4	10 $\frac{5}{8}$
16	0	36	0	12	24	0	4	0	28	0	7	25	7	10	22	0	11
16	6	37	2	12 $\frac{3}{8}$	24	0	4	1	28	10	7 $\frac{1}{4}$	26	4	10 $\frac{1}{4}$	22	9	11 $\frac{1}{4}$
17	0	38	3	12 $\frac{1}{2}$	25	6	4	2	29	8	7 $\frac{7}{16}$	27	2	10 $\frac{5}{8}$	23	4	11 $\frac{5}{8}$
17	6	39	4	13 $\frac{1}{8}$	26	3	4	4	30	7	7 $\frac{10}{16}$	28	0	10 $\frac{7}{8}$	24	1	12
18	0	40	6	13 $\frac{1}{2}$	27	0	4	6	31	6	7 $\frac{13}{16}$	28	10	11 $\frac{1}{4}$	25	3	12 $\frac{3}{8}$
18	6	41	7	13 $\frac{3}{8}$	27	9	4	7	32	4	8	29	1	11 $\frac{1}{2}$	25	6	12 $\frac{5}{8}$
19	0	42	9	14 $\frac{1}{4}$	28	6	4	8	33	2	8 $\frac{3}{16}$	30	5	11 $\frac{3}{8}$	26	1	13 $\frac{1}{16}$
19	6	43	10	14 $\frac{5}{8}$	29	3	4	10	34	1	8 $\frac{5}{8}$	31	2	12 $\frac{1}{8}$	27	0	13 $\frac{3}{8}$
20	0	45	0	15	30	0	5	0	35	0	8 $\frac{9}{16}$	32	0	12 $\frac{1}{2}$	27	6	13 $\frac{5}{8}$
20	6	46	2	15 $\frac{3}{8}$	30	9	5	2	35	11	8 $\frac{11}{16}$	32	9	12 $\frac{3}{4}$	28	3	14
21	0	47	3	15 $\frac{1}{2}$	31	6	5	4	36	10	8 $\frac{15}{16}$	33	7	13 $\frac{1}{8}$	28	10	14 $\frac{1}{8}$
21	6	48	4	16 $\frac{1}{8}$	32	3	5	5	37	8	9 $\frac{1}{16}$	34	3	13 $\frac{3}{8}$	29	7	14 $\frac{3}{8}$
22	0	49	6	16 $\frac{1}{2}$	33	0	5	6	38	6	9 $\frac{5}{16}$	35	0	13 $\frac{5}{8}$	30	3	15 $\frac{1}{8}$
22	6	50	7	16 $\frac{3}{4}$	33	9	5	7	39	4	9 $\frac{9}{16}$	35	10	14	31	0	15 $\frac{3}{8}$
23	0	51	9	17 $\frac{1}{4}$	34	6	5	8	40	2	10 $\frac{1}{16}$	36	9	14 $\frac{1}{2}$	31	7	15 $\frac{1}{2}$
23	6	52	11	17 $\frac{5}{8}$	35	3	5	10	41	1	10 $\frac{1}{4}$	37	1	14 $\frac{5}{8}$	32	4	16 $\frac{1}{8}$
24	0	54	0	18	36	0	6	0	42	0	10 $\frac{3}{4}$	38	5	15	33	0	16 $\frac{1}{2}$

Table No. VI. shows the lengths and diameters in the deck of all lower-masts for cutters or smacks, from 10 feet to 23 feet extreme breadth, against which is given the length and diameter of top-masts, bowsprits, main boom, and gaff, with the length and diameter of the spread yard. To find the diameters and their quarterings and head, take them from tables No. III. and IV., by referring to their main diameters in the deck, or at the slings for the yards, booms, and gaffs.

TABLE No. VI.

Main breadth.	Length of the mast from deck to head.		Diameter in the deck.		Length of the top-mast, including the pole.		Length of the pole head.		Diameter in the cap.		Length of the bowsprit.		Diameter in the sheet.		Length of the gaff.		Diameter three feet from the mast.		Length of the spread yard.		Diameter in the slings.	
ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	
10	27	6	8 $\frac{1}{2}$	17	6	2	6	4 $\frac{1}{16}$	22	6	6 $\frac{1}{4}$	22	6	5	17	6	3 $\frac{1}{8}$	22	6	3 $\frac{1}{8}$	9 $\frac{1}{8}$	
10 $\frac{1}{2}$	28	11	8 $\frac{1}{2}$	18	5	2	7	4 $\frac{1}{4}$	23	8	6 $\frac{1}{2}$	23	8	5 $\frac{1}{2}$	18	5	3 $\frac{1}{4}$	23	8	3 $\frac{1}{4}$	9 $\frac{1}{2}$	
11	30	2	8 $\frac{1}{2}$	19	3	2	9	4 $\frac{1}{2}$	24	9	6 $\frac{3}{4}$	24	9	5 $\frac{1}{2}$	19	3	3 $\frac{7}{16}$	24	9	3 $\frac{7}{16}$	9 $\frac{3}{4}$	
11 $\frac{1}{2}$	31	7	9 $\frac{1}{4}$	20	2	2	10	4 $\frac{5}{8}$	25	10	7 $\frac{3}{16}$	25	10	5 $\frac{1}{2}$	20	2	3 $\frac{5}{8}$	25	10	3 $\frac{5}{8}$	9 $\frac{5}{8}$	
12	33	0	9 $\frac{1}{4}$	21	0	3	0	4 $\frac{7}{8}$	27	0	7 $\frac{1}{2}$	27	0	6	21	0	3 $\frac{7}{8}$	27	0	3 $\frac{7}{8}$	9 $\frac{7}{8}$	
12 $\frac{1}{2}$	34	4	10 $\frac{1}{8}$	21	10	3	1	5 $\frac{1}{16}$	28	1	7 $\frac{1}{2}$	28	1	6 $\frac{1}{4}$	21	10	3 $\frac{7}{8}$	28	1	3 $\frac{7}{8}$	9 $\frac{7}{8}$	
13	35	9	10 $\frac{1}{8}$	22	9	3	3	5 $\frac{1}{4}$	29	3	8 $\frac{1}{8}$	29	3	6 $\frac{1}{2}$	22	9	4 $\frac{1}{16}$	29	3	4 $\frac{1}{16}$	10 $\frac{1}{16}$	

TABLE No. VI. continued.

13 $\frac{1}{2}$	37	1	11	23	7	3	5	5 $\frac{1}{2}$	30	4	8 $\frac{7}{16}$	30	4	6 $\frac{1}{4}$	23	7	4 $\frac{1}{4}$	30	4	4 $\frac{1}{4}$	4 $\frac{1}{4}$
14	38	6	11 $\frac{2}{3}$	24	6	3	6	5 $\frac{5}{8}$	31	6	8 $\frac{3}{4}$	31	6	7	24	6	4 $\frac{3}{8}$	31	6	4 $\frac{3}{8}$	4 $\frac{3}{8}$
14 $\frac{1}{2}$	39	10	11 $\frac{2}{3}$	25	4	3	7	5 $\frac{5}{8}$	32	8	9 $\frac{1}{16}$	32	8	7 $\frac{1}{2}$	25	4	4 $\frac{5}{8}$	32	8	4 $\frac{5}{8}$	4 $\frac{5}{8}$
15	41	3	12 $\frac{1}{8}$	26	3	3	9	6 $\frac{1}{16}$	33	9	9 $\frac{3}{8}$	33	9	7 $\frac{1}{2}$	26	3	4 $\frac{1}{16}$	33	9	4 $\frac{1}{16}$	4 $\frac{1}{16}$
15 $\frac{1}{2}$	42	7	12 $\frac{1}{2}$	27	1	3	11	6 $\frac{1}{4}$	34	10	9 $\frac{1}{16}$	34	10	7 $\frac{3}{4}$	27	1	4 $\frac{1}{16}$	34	10	4 $\frac{1}{16}$	4 $\frac{1}{16}$
16	44	0	13	28	0	4	0	6 $\frac{1}{2}$	36	0	10	36	0	8	28	0	5	36	0	5	5
16 $\frac{1}{2}$	45	4	13 $\frac{1}{2}$	28	10	4	1	6 $\frac{3}{8}$	37	2	10 $\frac{5}{16}$	37	2	8 $\frac{1}{4}$	28	10	5 $\frac{1}{8}$	37	2	5 $\frac{1}{8}$	5 $\frac{1}{8}$
17	46	9	13 $\frac{1}{4}$	29	9	4	3	6 $\frac{7}{16}$	38	3	10 $\frac{5}{8}$	38	3	8 $\frac{1}{2}$	29	9	5 $\frac{5}{16}$	38	3	5 $\frac{5}{16}$	5 $\frac{5}{16}$
17 $\frac{1}{2}$	48	1	14 $\frac{1}{8}$	30	7	4	4	7 $\frac{1}{16}$	39	4	10 $\frac{13}{16}$	39	4	8 $\frac{1}{2}$	30	7	5 $\frac{3}{8}$	39	4	5 $\frac{3}{8}$	5 $\frac{3}{8}$
18	49	6	14 $\frac{1}{4}$	31	6	4	6	7 $\frac{1}{8}$	40	6	11 $\frac{1}{4}$	40	6	9	31	6	5 $\frac{5}{8}$	40	6	5 $\frac{5}{8}$	5 $\frac{5}{8}$
18 $\frac{1}{2}$	50	10	15 $\frac{1}{8}$	32	4	4	8	7 $\frac{1}{2}$	41	8	11 $\frac{9}{16}$	41	8	9 $\frac{1}{4}$	32	4	5 $\frac{3}{4}$	41	8	5 $\frac{3}{4}$	5 $\frac{3}{4}$
19	52	3	15 $\frac{1}{4}$	33	3	4	9	7 $\frac{3}{4}$	42	9	11 $\frac{7}{8}$	42	9	9 $\frac{1}{2}$	33	3	6	42	9	6	6
19 $\frac{1}{2}$	53	7	15 $\frac{3}{8}$	34	1	4	11	7 $\frac{7}{8}$	43	10	12 $\frac{3}{16}$	43	10	9 $\frac{3}{4}$	34	1	6 $\frac{1}{8}$	43	10	6 $\frac{1}{8}$	6 $\frac{1}{8}$
20	55	0	16 $\frac{1}{8}$	35	0	5	0	8 $\frac{1}{4}$	45	0	12 $\frac{1}{2}$	45	0	10	35	0	6 $\frac{1}{4}$	45	0	6 $\frac{1}{4}$	6 $\frac{1}{4}$
20 $\frac{1}{2}$	56	4	16 $\frac{1}{4}$	35	10	5	1	8 $\frac{3}{4}$	46	1	12 $\frac{13}{16}$	46	1	10 $\frac{1}{4}$	35	10	6 $\frac{3}{8}$	46	1	6 $\frac{3}{8}$	6 $\frac{3}{8}$
21	57	9	17	36	9	5	3	8 $\frac{1}{2}$	47	3	13 $\frac{1}{4}$	47	3	10 $\frac{1}{2}$	36	9	6 $\frac{9}{16}$	47	3	6 $\frac{9}{16}$	6 $\frac{9}{16}$
21 $\frac{1}{2}$	59	1	17 $\frac{1}{2}$	37	7	5	4	8 $\frac{5}{8}$	48	5	13 $\frac{7}{8}$	48	5	10 $\frac{3}{4}$	37	7	6 $\frac{1}{16}$	48	5	6 $\frac{1}{16}$	6 $\frac{1}{16}$
22	60	6	17 $\frac{3}{4}$	38	6	5	6	8 $\frac{3}{4}$	49	6	13 $\frac{1}{2}$	49	6	11	38	6	6 $\frac{7}{8}$	49	6	6 $\frac{7}{8}$	6 $\frac{7}{8}$
22 $\frac{1}{2}$	61	10	18 $\frac{1}{4}$	39	4	5	7	9 $\frac{1}{8}$	50	8	14 $\frac{1}{16}$	50	8	11 $\frac{1}{4}$	39	4	7	50	8	7	7
23	63	2	18 $\frac{1}{2}$	40	3	5	9	9 $\frac{1}{4}$	51	9	14 $\frac{3}{8}$	51	9	11 $\frac{3}{4}$	40	3	7 $\frac{3}{16}$	51	9	7 $\frac{3}{16}$	7 $\frac{3}{16}$

Table No. VII. gives the lengths of the main and mizzen-masts of ketches, with their diameters in the deck; together with the bowsprit standing and running, including the top-masts, for vessels from 10 feet to 20 feet extreme breadth. The quarterings for making the masts and top-masts are to be taken from table No. III., by referring to their correspondent diameters in the deck; the yards, in like manner, are to be taken from table No. IV., taking their diameter at the slings.

TABLE No. VII.

Main breadth.	Length of the main-mast from deck to head.	Diameter in the deck.	Length of the main top-mast.	Diameter in the deck.	Length of the mizzen-mast from deck to head.	Diameter in the deck.	Length of the mizzen top mast, including the pole.	Diameter in the deck.	Length of the standing bowsprit.	Diameter in the deck.	Length of the running bowsprit.	Diameter in the deck.
ft. in.	ft. in.	in.	ft. in.	in.	ft. in.	in.	ft. in.	in.	ft. in.	in.	ft. in.	in.
10 0	22 6	7 1	15 0	4 $\frac{3}{8}$	17 6	5	15 0	3 $\frac{1}{8}$	15 0	6 $\frac{7}{8}$	20 0	6 $\frac{1}{4}$
10 6	23 8	7 $\frac{1}{2}$	15 9	4 $\frac{9}{16}$	18 4	5 1	15 9	3 $\frac{1}{4}$	15 9	7 $\frac{1}{8}$	21 0	6 $\frac{1}{2}$
11 0	24 9	8 1	16 6	4 $\frac{13}{16}$	19 3	5 $\frac{1}{2}$	16 6	3 $\frac{7}{16}$	16 6	7 $\frac{1}{4}$	22 0	6 $\frac{7}{8}$
11 6	25 10	8 $\frac{1}{2}$	17 3	5	20 0	5 $\frac{1}{4}$	17 3	3 $\frac{1}{16}$	17 3	7 $\frac{3}{16}$	23 0	7 $\frac{1}{16}$
12 0	27 0	9 $\frac{1}{4}$	18 0	5 $\frac{1}{4}$	21 0	6	18 0	3 $\frac{1}{4}$	18 0	8 $\frac{1}{8}$	24 0	7 $\frac{1}{2}$
12 6	28 3	9 $\frac{1}{2}$	18 9	5 $\frac{7}{16}$	21 10	6 $\frac{1}{4}$	18 9	3 $\frac{1}{4}$	18 9	8 $\frac{3}{8}$	25 0	7 $\frac{3}{8}$
13 0	29 4	9 $\frac{3}{4}$	19 6	5 $\frac{11}{16}$	22 9	6 $\frac{1}{2}$	19 6	4 $\frac{1}{16}$	19 6	8 $\frac{7}{8}$	26 0	8 $\frac{1}{4}$

TABLE No. VII. continued.

13	6	30	5	10 $\frac{1}{8}$	20	3	5 $\frac{11}{16}$	23	7	6 $\frac{3}{4}$	20	3	4 $\frac{3}{16}$	20	3	9 $\frac{1}{4}$	27	0	8 $\frac{1}{2}$
14	0	31	6	10 $\frac{1}{4}$	21	0	6 $\frac{1}{2}$	24	6	7	21	0	4 $\frac{3}{8}$	21	0	9 $\frac{3}{8}$	28	0	8 $\frac{3}{4}$
14	6	32	8	10 $\frac{7}{8}$	21	9	6 $\frac{5}{16}$	25	4	7 $\frac{1}{4}$	21	9	4 $\frac{9}{16}$	21	9	10	29	0	9 $\frac{1}{16}$
15	0	33	9	11 $\frac{1}{4}$	22	6	6 $\frac{9}{16}$	26	3	7 $\frac{1}{2}$	22	6	4 $\frac{1}{16}$	22	6	10 $\frac{3}{8}$	30	0	9 $\frac{3}{8}$
15	6	34	11	11 $\frac{5}{8}$	23	3	6 $\frac{3}{4}$	27	1	7 $\frac{3}{4}$	23	3	4 $\frac{1}{16}$	23	3	10 $\frac{3}{4}$	31	0	9 $\frac{1}{16}$
16	0	36	0	12	24	0	7	28	0	8	24	0	5	24	0	11	32	0	10
16	6	37	2	12 $\frac{3}{8}$	24	9	7 $\frac{3}{16}$	28	10	8 $\frac{1}{4}$	24	9	5 $\frac{1}{8}$	24	9	11 $\frac{3}{8}$	33	0	10 $\frac{5}{16}$
17	0	38	3	12 $\frac{3}{4}$	25	6	7 $\frac{3}{8}$	29	9	8 $\frac{1}{2}$	25	6	5 $\frac{5}{16}$	25	6	11 $\frac{5}{8}$	34	0	10 $\frac{3}{8}$
17	6	39	4	13 $\frac{1}{8}$	26	3	7 $\frac{5}{8}$	30	7	8 $\frac{3}{4}$	26	3	5 $\frac{7}{16}$	26	3	12	35	0	10 $\frac{7}{8}$
18	0	40	6	13 $\frac{1}{2}$	27	0	7 $\frac{7}{8}$	31	6	9	27	0	5 $\frac{10}{16}$	27	0	12 $\frac{3}{8}$	36	0	11 $\frac{1}{4}$
18	6	41	7	13 $\frac{5}{8}$	27	9	8 $\frac{1}{16}$	32	4	9 $\frac{1}{4}$	27	9	5 $\frac{13}{16}$	27	9	12 $\frac{5}{8}$	37	0	11 $\frac{9}{16}$
19	0	42	9	14 $\frac{1}{4}$	28	6	8 $\frac{5}{16}$	33	3	9 $\frac{1}{2}$	28	6	6	28	6	13	38	0	11 $\frac{7}{8}$
19	6	44	0	14 $\frac{5}{8}$	29	3	8 $\frac{1}{2}$	34	1	9 $\frac{3}{4}$	29	3	6 $\frac{1}{8}$	29	3	13 $\frac{3}{8}$	39	0	12 $\frac{1}{4}$
20	0	45	0	15	30	0	8 $\frac{3}{4}$	35	0	10	30	0	6 $\frac{1}{4}$	30	0	13 $\frac{3}{4}$	40	0	12 $\frac{3}{4}$



The sketch or drawing that accompanies this work shows an easy and more correct method than any now in use for producing all the diameters from the deck to the head of all lower masts, and from the fid to the head of all topmasts and topgallant-masts. Let the person who may be in the habit of making masts or yards, take a clean piece of fir board,  $\frac{5}{8}$  of an inch thick, and  $14\frac{1}{2}$  inches square, run in a line, half inch from one edge, as a base, shown by A A, with a square run in the perpendicular line A B; open your compass to 14 inches, fix one leg at the angle A, and sweep round the quarter of a circle, as shown by A B, which gives the segment of a mast in the deck of 28 inches diameter; divide this quarter of a circle into three equal parts, the first third from the base line divide into four equal parts, as shewn from A to 4, those taken square from the perpendicular give the five settings off from the deck to the honnds; divide the middle third into halves, that part nearest the base also divide, see 5 and 6, which gives the settings off 5 above the honnds, & 6 the head of the mast. Your board being now prepared, you have only to get the diameter of any mast or topmast; sweep round the size, and the intersection of the division lines from a square gives the settings off. On the other side of the board run in like manner a base and perpendicular lines, fix your compass to eight inches, and sweep round the segment of a yard, whose diameter will be 16 inches; divide this segment into three equal parts, the first and second next the base divide into equal parts, as shewn by A to 4; square those to the perpendicular, which gives the five settings off from the middle line, A being the slings, and 4 the size at the end of the yard; sweep round in this segment any size yard about to be made, & square to the perpendicular at each intersection gives the settings off at each quarter. A B C represent a trammel or gauge for the purpose of racing in the eight square from the middle line, of all masts or yards; it is more correct and performed in less time than by a line; the one shown is only at four inches in diameter, but if one is made to go over a mast or yard of 14 inches, & another of 24 inches, those two will answer almost every purpose; they may be made from a piece of elm board, of  $\frac{5}{8}$  of an inch thick, and six or seven inches in breadth. a, a, show the extent of the gauge, whose edge shows a V, b the centre, c c the two points set off from the centre as the eight square of four inches; observe that you are correct in fixing your points to the eight square of the breadth of the gauge. In applying it throughout, keep the two sides of the gauge close to the mast or yard, and the eight square will be correct.

FINIS.

